DISSERTATION

FOR THE AWARD OF DEGREE

MASTER OF SCIENCE

SESSION 2022-2024

A SURVEY ON RADIOGRAPHERS TO ASSESS THE REASONS OF REJECTING X-RAY IMAGES IN DELHI-NCR, INDIA, 2024.

By

SWATI BANSAL

MSc. in Medical Imaging Technology

Enrolment no- (950122478)

DEPARTMENT OF RADIO - DIAGNOSIS

SANTOSH DEEMED TO BE UNIVERSITY NO. 1,

SANTOSH NAGAR, GHAZIABAD-201009,

DELHI NCR, INDIA

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GUIDE: **Name: Ms. Neelam Rao Bharti**
Designation: Assistant Professor
Department of Radio-diagnosis (Medical Imaging Technology)
Santosh Deemed to be University, Ghaziabad-201009

CERTIFICATE BY THE CO-GUIDE

This is to certify that the dissertation titled "**A SURVEY ON RADIOGRAPHERS TO ASSESS THE REASONS OF REJECTING X-RAY IMAGES IN DELHI-NCR, INDIA, 2024**" is a bonafide genuine research work carried out by **Swati Bansal** in partial fulfillment of the requirement for the degree of **M.Sc. Medical Imaging Technology** under my supervision and guidance in the **Department of Radio-diagnosis** Santosh Deemed to be University, Ghaziabad, (U.P).

CO-GUIDE: **Name: Mr. Himanshu Mishra**

Designation: Assistant Professor

Department of Radio-diagnosis (Medical Imaging Technology)

Santosh Deemed to be University, Ghaziabad-201009

CERTIFICATE BY THE HEAD OF DEPARTMENT

This is to certify that the dissertation title being submitted by "**A SURVEY ON RADIOGRAPHERS TO ASSESS THE REASONS OF REJECTING X-RAY IMAGES IN DELHI-NCR, INDIA, 2024**" in partial fulfillment of the requirement for the degree of **M.Sc. Medical Imaging Technology** is based on the bonafide work carried out by him in the Department of Radio-diagnosis, Santosh Deemed to be University, Ghaziabad, (U.P).

Name: Dr. Ashok Kumar Sharma
Designation: Professor and Head of Department
Department of Radio-Diagnosis
Santosh Deemed to be University,
Ghaziabad-201009

ENDORSEMENT BY DEAN ACADEMICS OF THE UNIVERSITY

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Dr Shalabh Gupta

MBBS, MS

Dean Academics

Santosh Deemed to be University,

Ghaziabad-201009

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This is to certify that the statistical analysis component of the thesis titled "**A SURVEY ON RADIOGRAPHERS TO ASSESS THE REASONS OF REJECTING X-RAY IMAGES IN DELHI-NCR, INDIA, 2024**" done by **Swati Bansal** in the **Department of Radio-diagnosis** at Santosh Medical College and Hospital, Ghaziabad, has been conducted under my direct guidance and supervision.

All the statistical calculations of this study are authentic and correct to the best of my knowledge.

Name: Dr. Kirti Bhardwaj

Designation: Assistant professor and Bio-statistician

Central Research Facility

Santosh Deemed to be University,

Ghaziabad-201009

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ACKNOWLEDGEMENT

My first and foremost task is to almighty to present me with this opportunity to complete this project.

With great pride and Pleasure, I express thanks to **Dr. ASHOK KUMAR SHARMA,** Professor and Head of the Department for undertaking this project.

I am thankful & grateful to my project guide **Ms. Neelam Rao Bharti Assistant Professor** & Co-guide **Mr. Himanshu Mishra** who has been my constant source of inspiration and has given me kind advice, encouragement, and guidance throughout the project **"A SURVEY ON RADIOGRAPHERS TO ASSESS THE REASONS OF REJECTING X-RAY IMAGES IN DELHI-NCR, INDIA, 2024"** and helping & guiding tocomplete the project successfully.

I would like to express my gratitude towards the Teaching faculty **Dr. Bhawna Solanki**, **Ms. Anjali Jain**, **Mr. Sanoop kumar Dahiya** who has given me kind advice throughout the project and helping & guiding to complete the project successfully.

I also thank all the Technician staff members of the **Department of Radio-Diagnosis (Mr. Ramesh Chandra Babu, Mr. Pawan Goel and Mr. Methews kcherian)** for helping and guiding me to completing this project with great success.

I also express sincere thanks to my college batchmates and friends for helping and supporting me to complete this project with great success.

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ABBREVIATIONS

Sr No.	Abbreviations	Full Form
1.	DR	DIGITAL RADIOGRAPHY
2.	CR	COMPUTED RADIOGRAPHY
3.	ALARA	AS LOW AS REASONABLY ACHIEVABLE
4.	QC	QUALITY CONTROL
5.	PACS	PICTURE ARCHIVING AND COMMUNICATION SYSTEM
6.	ICRP	INTERNATIONAL COMMISSION OF RADIOLOGICAL PROTECTION
7.	QA	QUALITY ASSURANCE
8.	RA	REJECT ANALYSIS
9.	CQI	CONTINUOUS QUALITY IMPROVEMENT
10.	RR	REJECT RATES
11.	DDR	DIRECT DIGITAL RADIOGRAPHY
12.	RAD	RADIOLOGY ACQUIRED DEPARTMENT
13.	MCI	MASS CASUALTY INCIDENTS
14.	PTH	PORT-SUDAN TEACHING HOSPITAL
15.	SCH	SEA PORTS CORPORATION HOSPITAL
16.	PH	POLICE HOSPITAL

ABSTRACT

Reject analysis is an important component of quality assurance programs for medical imaging departments. It forms a basis for determining the causes of rejected images and helps guide radiographer training, department workflow and ultimately reduces patient dose. The primary aim was radiographers to assess the reasons of rejecting X-ray images in Delhi-NCR, India. This cross -sectional study included 289 radiology employees (Radiographers, Technologist) as participants. Google form were used to collect all data form MCQ questionnaires. The current study was carried out through Google form with approval of the Ethical Committee SANTOSH MEDICAL COLLEGE & DEEMED TO BE A UNIVERSITY. A designed questionnaire with 34 question was used to assessment participants. The questionnaire was divided into two section: demographic data & assess the reason of x-ray rejecting images among radiographers, technologist. A significant majority (82.3%) of respondents reported facing challenges in communicating the reason for images rejection to other team members. The standardized process for communicating rejected image to radiographers is in place for 76.7% 0f respondents indicating that while most departments have a system, There's still room for departments. Pediatric imaging was identified as the most challenging scenario for exposure factor adjustments (49.7%). To reduce the likelihood of rejected x-ray images, enhanced quality control was the most suggested improvement (37.5%). 38.9% of respondents indicated that radiographer collaboration with other departments needs improvement. Radiology students need a higher general understanding and assessment of the radiographers. The study provides valuable insights into the reasons behind X-ray image rejection, offering a basis for targeted interventions to improve image quality and efficiency. Addressing the identified issues can lead to better diagnostic outcomes and optimized use of X-ray technology in clinical settings.

Keywords: X-ray, image rejection, radiographers, image quality, Image rejection criteria, Image quality assessment, Diagnostic Imaging Errors.

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CHAPTER – 1

INTRODUCTION

Background

X-ray imaging is a cornerstone of diagnostic radiology, providing critical information for the diagnosis and management of various medical conditions. Despite its importance, the quality of X-ray images is crucial for accurate diagnosis and patient care. High-quality images facilitate clear visualization of anatomical structures and pathological conditions, whereas suboptimal images can lead to misdiagnosis, delayed treatment, and unnecessary additional imaging, thereby increasing patient exposure to radiation.

In clinical practice, image rejection refers to the process of discarding X-ray images that do not meet the required diagnostic quality standards. Rejection of X-ray images not only impacts the efficiency of the diagnostic workflow but also has implications for patient safety and radiation exposure. According to existing literature, a significant proportion of X-ray images are rejected due to various factors including technical errors, equipment malfunctions, and human factors. For instance, errors in positioning, incorrect exposure settings, and poor technique are common causes of image rejection. Additionally, issues with imaging equipment, such as calibration errors or hardware failures, can compromise image quality.

The impact of image rejection is multifaceted. Clinically, rejected images may necessitate repeat imaging, leading to increased patient radiation dose and delayed diagnosis. Operationally, the need to repeat procedures adds to the workload of radiographers and can strain healthcare resources. Furthermore, frequent image rejections may indicate underlying issues with training, protocols, or equipment maintenance, all of which contribute to inefficiencies in radiology departments. Previous studies have suggested that targeted interventions, such as enhanced training for radiographers, improved equipment maintenance protocols, and optimized imaging procedures, can help reduce the incidence of image rejection. However, comprehensive data on the specific reasons for image rejection and their relative impact on imaging practices are limited. This study seeks to address this gap by surveying radiographers to gain a detailed understanding of the reasons behind X-ray image rejections. By identifying the predominant causes and evaluating their frequency, the research aims to inform

strategies for improving image quality and reducing rejection rates. This will contribute to better diagnostic accuracy, improved patient outcomes, and more efficient use of radiological resources.

1.1 Diagnostic Quality and Radiation Safety

In the healthcare industry, medical imaging is essential for a number of purposes, including monitoring, diagnosis, treatment planning, and screening. Every hospital's radiology departments adhere to the ALARA *as low as reasonably achievable* guidelines, which guarantee the provision of high-quality images while protecting patients from needless ionizing radiation exposure.[1]

X-ray modalities, which are widely utilized, use ionizing radiation to create diagnostic images. Overexposure can raise the chance of harmful health outcomes, such as malignancies and stochastic effects, as this form of radiation can have biological effects[2]

A number of international organizations have established recommendations for pediatric radiography that prioritize appropriate image quality and the delivery of radiation doses in order to ensure patient safety. It is the duty of radiologists to expose juvenile patients to x-rays within predetermined limits (kVp, mAs) that influence the radiation dose administered and image quality.10 However, the primary responsibility of radiologists is the diagnosis and detection of pathology[3].

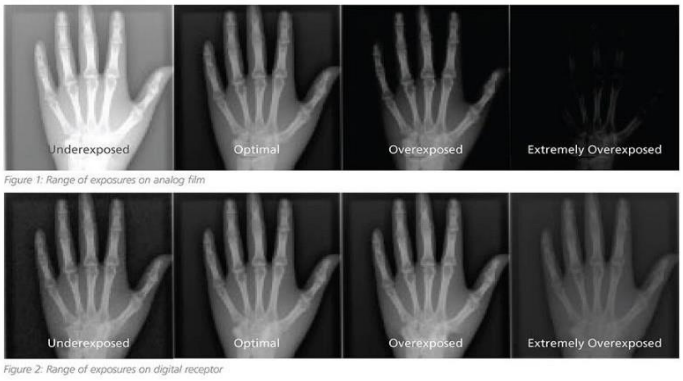

Figure no. 1: Diagnostic quality & Image quality

[1] Waaler D, Hofmann B. Image rejects/retakes—radiographic challenges. Radiation protection dosimetry. 2010 Apr 1;139 (1-3):375-9.

[2] Kjelle E, Schanche AK, Hafskjold L. To keep or reject, that is the question-A survey on radiologists and radiographers' assessments of plain radiography images. Radiography. 2021 Feb 1;27(1):115-9.

[3] Frush D. The cumulative radiation dose paradigm in pediatric imaging. The British Journal of Radiology. 2021 Oct 1;94(1126):20210478.

1.2 Evaluating Image Reject Rates in Radiography

The proportion of diagnostic images not applied for diagnostic purposes is an indicator of image quality, safety, and efficiency in radiography.[4]Despite increased awareness, image rejection is still a substantial problem and needs continued observation and targeted measures. Accordingly, the objective of this study is to estimate the extent, variation, and characteristics of image rejects, in order to improve the quality, safety, and efficiency in radiography. Reject analysis is described as 'the critical evaluation of radiographs which are used as part of the imaging service but do not play a useful part in the diagnostic process.[5] Image reject analysis (RA) is a quality control (QC) process and an important component of quality assurance (QA) programs to measure the efficiency of radiology departments by determining the rates and reasons for rejected images. A rejected image is an image that is deemed to not add any additional diagnostic value to the clinical analysis which in practice is based on the subjective evaluation by a medical imaging technologist (MIT) at the time of image acquisition. A is a quality indicator tool for continuous quality improvement (CQI) in the planning of interventions such as MIT educational strategies, evaluating current and developing new examination protocols, assessing the level of image quality and keeping track of reducing unnecessary radiation dose to the patient.[6]

Figure no.2: Image Reject film

[4] Hofmann B, Rosanowsky TB, Jensen C, Wah KH. Image rejects in general direct digital radiography. Acta radiologica open. 2015 Sep 30;4(10):2058460115604339.

[5] Mc Fadden S, Roding T, De Vries G, Benwell M, Bijwaard H, Scheurleer J. Digital imaging and radiographic practise in diagnostic radiography: An overview of current knowledge and practice in Europe. Radiography. 2018 May 1;24(2):137-41.

[6] Atkinson S, Neep M, Starkey D. Reject rate analysis in digital radiography: an Australian emergency imaging department case study. Journal of medical radiation sciences. 2020 Mar;67(1):72-9.

1.3 Image Rejects and Repeats in Radiological Imaging: Implications for Quality Control, Patient Safety, and Resource Optimization

Rejects, deletions, and repeated images in radiological imaging raise concerns regarding professional and ethical standards, highlighting potential shortcomings in quality control. A rejected image is an unacceptable radiograph with inadequate diagnostic value regarding image quality, evaluated by technologists based on technical qualities. Repeatedly taking X-ray images exposes patients to unnecessary ionizing radiation, which poses a substantial risk of cancer development even at prolonged low-dose exposure[7]. However, the overall benefits of medical imaging examinations are believed to outweigh the associated risks, except in cases where redundant examinations are conducted. Therefore, it is crucial to actively reduce the need for image retakes, as it helps minimize X-ray exposure, mitigates patient inconvenience, and optimizes the allocation of medical resources for quality assurance purposes in healthcare settings. The analysis of rejected images serves as a foundation for identifying the reasons for image rejection, and it is also used to evaluate radiographer training and workflow for quality assurance. Moreover, it helps in the safe use of radiation by considering the amount of ionizing radiation a patient is exposed to and the quality of the generated image, so it should be included as part of all quality control and assurance programs. Risk analysis helps identify other underlying issues, such as deficiency in staff training and increasing the department's performance by decreasing retakes to reduce waiting time.[8]

Figure no.3: Patients safety

[7] Mercieca N, Portelli JL, Jadva-Patel H. Mammographic image reject rate analysis and cause–a National Maltese Study. Radiography. 2017 Feb 1;23(1):25-31.

[8] Saade C, Siblini L, Karout L, Khalife S, Hilal H, Abbas S, Salman R, Naffaa L. To repeat or not to repeat: Radiologists demonstrated more decisiveness than their fellow radiographers in reducing the repeat rate during mobile chest radiography. Radiography. 2021 May 1;27(2):304-9.

1.4 Radiograph Quality on Diagnostic Accuracy, Radiation Exposure

In diagnostic imaging, the accuracy of the physician's clinical diagnosis on the internal anatomical condition and physiology of the body depends on the radiographs' quality. A high-quality image should meet radiological technical standards as well as possessing the necessary diagnostic value. Yet, when the image is of poor quality, it is likely to be rejected, and its repetition will expose patients and staff to unnecessary ionizing radiation[9]. This repetition precludes applying the principle "As Low as Reasonably Achievable" (ALARA) in regard to ionizing radiation doses to patients and staff. The potential risk of stochastic effects rises after prolonged ionizing radiation exposure. Additionally, the rejected images drastically affect the department's efficiency and patient satisfaction, which in turn raises the department's expenditures [10]Rejects and subsequent retakes of radiographic images expose both patients and radiological personnel to unnecessary ionizing radiation.

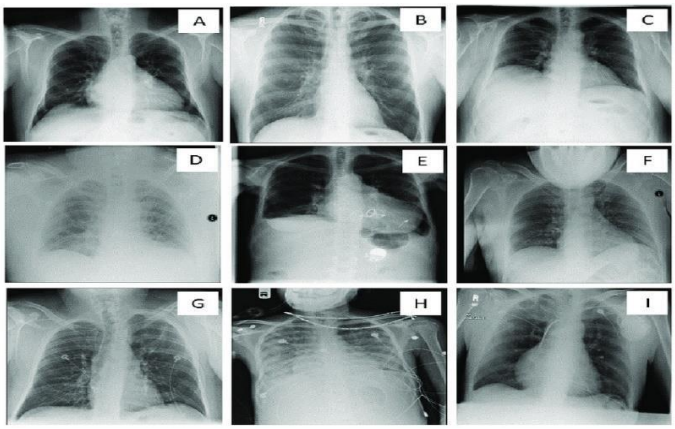

Figure no.4: Radiography quality$ Image exposure

Over exposure to ionizing radiation increases risk of probability of radiation induced stochastic effects. Repeated imaging further results in higher usage of both human and radiological resources Jones et al. state that rejected images are integral to X-ray imaging, where patient positioning and alignment are vital components of image quality.[4] During a radiological procedure, patient motion, positioning, and artifacts unique to the image receptor technology can result in repeated images and are reported as the

[9] Waaler D, Hammer S, Langdalen CC, Haug LT. How radiographers visually perceive X-ray images with the task of accepting or rejecting them–a pilot study.

[10] Waaler D, Hofmann B. Image rejects/retakes—radiographic challenges. Radiation protection dosimetry. 2010 Apr 1;139(1-3):375-9.

major reasons for image retakes. Examining the underlying causes for image rejections assists to identify any technical or training issues required in a radiology department.[11]

1.5 Reject Rates: Digital Radiography vs. Computed Radiography

It was expected that reject rates would decrease with the introduction of digital radiography (DR)[12]. This was because of the improved image quality available with DR as a result of the increased exposure latitude and post processing capabilities. International studies, however, have reported DR reject rates that are higher than those reported for computed radiography (CR). the reject rates reported for CR were around 5%. Departments with a combination of CR and DR are now reporting reject rates ranging from 4% to11%.[1]Most Australian medical imaging departments are now solely using DR equipment, due to incentives offered by the Australian government through the Medicare Benefits Schedule (capital sensitivity and financial rebates)[13].

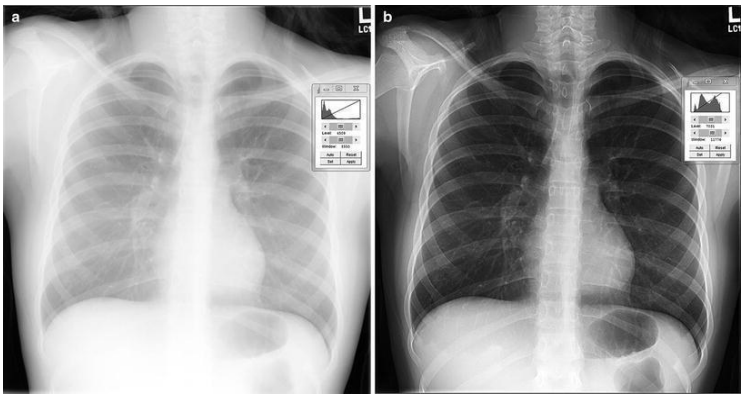

Figure no.5: Digital radiography vs Computed Radiography

However, there is a paucity of published articles that are specific to DR reject rates that have utilized a large sample size and there have been no such studies conducted in Australia. Subsequently, Australian medical imaging departments are unable to compare their DR reject rates to an equivalent Australian

[11] Whaley JS, Pressman BD, Wilson JR, Bravo L, Sehnert WJ, Foos DH. Investigation of the variability in the assessment of digital chest X-ray image quality. Journal of digital imaging. 2013 Apr; 26:217-26.

[12] Mount J. Reject analysis: A comparison of radiographer and radiologist perceptions of image quality. Radiography. 2016 May 1;22(2): e112-7.

[13] Kjelle E, Schanche AK, Hafskjold L. To keep or reject, that is the question-A survey on radiologists and radiographers' assessments of plain radiography images. Radiography. 2021 Feb 1;27(1):115-9.

evidence-base to determine whether their reject rates are appropriate. This has implications for monitoring the effectiveness, safety and diagnostic quality of contemporary radiographic practice.[14]

1.6 Technical Factors vs. Image Manipulation in Digital Radiography

It is well recognized that the three most important factors to consider when producing good image quality in digital imaging include appropriate selection of (i) tube voltage (ii) tube current (iii) exposure time. However, pre and post processing image manipulation is available for all digital radiography and enables manipulation of the resultant image hence, the selection of these technical factors may be perceived to play a less critical role in providing a good diagnostic image[15].When compared to film screen radiography, both computed and digital image receptors respond to x-ray exposure and produce digital data over a wider range of exposure intensities i.e. wider dynamic range. With conventional radiography the resultant radiograph reflects the quality and quantity of radiation interacting with the film as contrast and optical density. Therefore, diagnostic images can be obtained using a wider range of exposure factors as digital radiography is less mAs and kV dependent; this may reduce the need for repeat exposures however patients may be incurring higher radiation doses than are necessary. Previous studies have highlighted the trend for staff to overexpose rather than underexpose patients as this reduces quantum mottle on the resultant image and improves image quality.[16]

1.7 Challenges and Implications of Rejects and Retakes in Diagnostic X-Ray Imaging

[14] Mercieca N, Portelli JL, Jadva-Patel H. Mammographic image reject rate analysis and cause–a National Maltese Study. Radiography. 2017 Feb 1;23(1):25-31.

[15] Saade C, Siblini L, Karout L, Khalife S, Hilal H, Abbas S, Salman R, Naffaa L. To repeat or not to repeat: Radiologists demonstrated more decisiveness than their fellow radiographers in reducing the repeat rate during mobile chest radiography. Radiography. 2021 May 1;27(2):304-9.

[16] Waaler D, Hammer S, Langdalen CC, Haug LT. How radiographers visually perceive X-ray images with the task of accepting or rejecting them–a pilot study.

Rejects, deletions, and subsequent retakes of diagnostic X-ray images impose professional and ethical challenges within radiological imaging it occupies unnecessary processing and personnel resources indicates suboptimal quality management and exposes patients to unnecessary ionizing radiation and added inconveniences. Traditionally reject/deletion/ retake rates for film-based departments have been documented to be in the range of 10–15% and their main cause has been attributed incorrect exposures due to limited dynamic range of screen/film systems. This poses the question whether the reject rates really are as high as with film systems and why the problem did not vanish with the digital revolution, as presumed.[17]

Figure no.6: Rejects and Retakes in Diagnostic X-Ray Image.

1.8 Radiation Exposure and Minimizing Repeat Procedures

Medical imaging is one of the key diagnostic tools used in modern medical practice, providing practitioners with valuable information to make informed decisions at subsequent stages of care. Yet, there is an inherent risk versus benefit trade-off, as the radiographer has to decide whether 'the benefits of imaging outweigh the detrimental costs of ionizing radiation. Over exposure to ionizing radiation

[17] Waaler D, Hofmann B. Image rejects/retakes—radiographic challenges. Radiation protection dosimetry. 2010 Apr 1;139(1-3):375-9.

increases risk of malignancy and other stochastic effects, such as cancer and cell mutations[18]. As such, it is important that radiographers keep patient exposure to radiation to a minimum. Repeat imaging due to 'rejects' is a common problem in any radiology department and is responsible for the majority of unnecessary patient radiation doses. Medical imaging is one of the key diagnostic tools used in modern medical practice, providing practitioners with valuable information to make informed decisions at subsequent stages of care. Yet, there is an inherent risk versus benefit trade-off, as the radiographer has to decide whether 'the benefits of imaging outweigh the detrimental costs of ionizing radiation.[19] Over exposure to ionizing radiation increases risk of malignancy and other stochastic effects, such as cancer and cell mutations. As such, it is important that radiographers keep patient exposure to radiation to a minimum. Repeat imaging due to 'rejects' is a common problem in any radiology department and is responsible for the majority of unnecessary patient irradiation doses[20].

[18] Lau SL, Mak AS, Lam WT, Chau CK, Lau KY. Reject analysis: a comparison of conventional film–screen radiography and computed radiography with PACS. Radiography. 2004 Aug 1;10(3):183-7.

[19] Whaley JS, Pressman BD, Wilson JR, Bravo L, Sehnert WJ, Foos DH. Investigation of the variability in the assessment of digital chest X-ray image quality. Journal of digital imaging. 2013 Apr; 26:217-26.

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NEED FOR STUDY

The research is done in order to assess the reason for x-ray rejecting images in Delhi. This study is needed for Rejected images may necessary repeated X-ray procedures, increasing patient exposure to ionizing radiation. Reducing image rejection rates through improved imaging practices can help minimize unnecessary radiation exposure, thereby enhancing patient safety and aligning with the principle of as low as reasonably achievable (ALARA) in radiology. Understanding the root causes of image rejection is essential for developing targeted interventions that enhance image quality, reduce repeat imaging, and streamline radiological workflows. Addressing these issues can improve diagnostic outcomes, minimize patient risk, and optimize the use of resources within healthcare settings.

Problems

When assessing the reasons for rejecting X-ray images, radiographers must consider a range of factors related to both the technical aspects of image acquisition and the potential patient-specific variables. Technical issues are among the most common reasons for image rejection. These include improper exposure settings, such as incorrect kilovoltage peak (kVp) or milliampere-seconds (mAs) levels, which can result in overexposed or underexposed images that fail to provide adequate diagnostic information. Additionally, improper positioning of the patient or the X-ray machine can lead to artifacts or distortion in the images, compromising their diagnostic quality. It is also crucial to evaluate the calibration and maintenance of the X-ray equipment; any malfunctions or drift in calibration can adversely affect image quality. Patient-related factors, such as movement during the exposure or the presence of artifacts like clothing or metallic objects, can further contribute to image rejection. Radiographers must also be vigilant about environmental conditions, such as lighting and the cleanliness of the imaging environment, as these can impact the clarity and quality of the resulting images. To address these issues effectively, radiographers need to employ a comprehensive approach that includes regular equipment maintenance, adherence to standardized imaging protocols, and ongoing education to stay current with best practices. By meticulously evaluating and addressing these various factors, radiographers can reduce the likelihood of image rejection and ensure high-quality diagnostic images.

CHAPTER – 2

AIM AND OBJECTIVE

AIM

A survey study on radiographers to assess the reasons for rejecting X-ray images.

OBJECTIVE

1. To assess the reasons for the rejected x-ray image.
2. To assess about their knowledge of rejected X-ray image and understanding of Personal practice
3. The questionnaire was prepared to identify the level of radiographer's technologist and radiographers. The assessment of the knowledge of rejecting x- ray images and their understanding of personal practice.
4. The education and qualification level of radiography staff employed in the imaging departments.
5. To identify and analyze the primary factors contributing to the rejection of X-ray images by radiographers, and to evaluate their impact on patient radiation exposure and diagnostic efficiency.

HYPOTHESIS

H1= There will be significant two assessments of the reason for rejecting X-Ray Film among radiographers/technologists.

H0= There will be significant no two assessments of the reason for rejecting x- ray Film among radiographers/technologists.

CHAPTER - 3

REVIEW OF LITERATURE

3.1 "Mohamed Hasaneen, corresponding author, Noora AlHameli, Amel AlMinhali, Shamma Alshehhi, Suliman Salih, and Mohammad Mubarak Alomaim-Assessment-- image- rejection-in-digital-radiography (2023)"

Rejects, deletions, and repeated images in radiological imaging raise concerns regarding professional and ethical standards, highlighting potential shortcomings in quality control. A rejected image is an unacceptable radiograph with inadequate diagnostic value regarding image quality, evaluated by technologists based on technical qualities. The analysis of rejected images serves as a foundation for identifying the reasons for image rejection, and it is also used to evaluate radiographer training and workflow for quality assurance. Moreover, it helps in the safe use of radiation by considering the amount of ionizing radiation a patient is exposed to and the quality of the generated image, so it should be included as part of all quality control and assurance programs. A quantitative study was conducted in March 2022, focusing on radiographers working in hospitals across the UAE. The sample consisted of 62 radiographers randomly selected to participate in the study. There were no specific criteria regarding age or years of work experience for inclusion in the study. Quantitative data analysis was performed using Excel software. Descriptive and comparative analyses were conducted to assess similarities and differences in rejection rates and interpretations. This study aimed to examine the incidence of repetitive X-ray examinations among patients and investigate the underlying factors contributing to this issue. Some radiographers rejected images that could be enhanced through post-processing, often resulting from inadequate supervision and inspection. Data were collected in March 2022 from a sample of radiographers working in private and government hospitals across the UAE. Out of the 62 participants surveyed, 53% reported working in private hospitals, while 47% were exclusively employed in government hospitals. This research has provided valuable insights into the factors contributing to the repetition and retaking of images in radiology departments. The findings highlight the prominent role of positioning errors and artifacts as common causes of image retakes. Moreover, night shifts and workload affect radiographers' performance, which leads to a high possibility of retaking images. The most common artifacts that

led to retaking images were motion artifacts due to the patient's movement.

3.2 "B. Hofmann-skeletal -radiography in -two public hospitals- in Norway- 2023"

The proportion of diagnostic images not applied for diagnostic purposes is an indicator of image quality, safety, and efficiency in radiography. Despite increased awareness, image rejection is still a substantial problem and needs continued observation and targeted measures. Accordingly, the objective of this study is to estimate the extent, variation, and characteristics of image rejects, in order to improve the quality, safety, and efficiency in radiography. The reject rate is high and reduces quality, safety, and efficiency of imaging services. The reasons for image rejects are typical professionally reducible errors indicating great potential for improvement. The variation of rejection rate over time (RQ2) is substantial and may have many sources, such as case mix, variation in number and skills of professionals at work, day of week etc. Although there are some differences in reject rates between the beginning of the week and at the rest of the week, no clear pattern emerges from the data, and more research is needed to uncover the reasons for the temporal variations of image rejects.

3.3 "Gabriela Bantas BMedImag Rhonda-Joy Sweeney Sibusiso Mdletshe-Digital radiography-reject – analysis- A -comparison -between -two –radiology-(2023)"

Image reject analysis (RA) in direct digital radiography (DDR) is an important quality indicator tool. Analysis of rejected images is a component of quality assurance (QA) programs, with the overall aim of reducing patient radiation dose. This study aimed to compare differences in image rejection rates (RR) and the reasons for rejection between two radiology departments. A retrospective quantitative descriptive study of images performed across the two radiology departments (RAD 1 and RAD 2) acquired with DDR systems between the beginning of February and the end of May 2021 was undertaken. Collected data included the medical imaging technologist (MIT) selection of image rejection reasons for different anatomic regions and compared between the two radiology departments. The implementation of image RA remains a key part of QA in radiology departments utilizing DDR systems. This study recommends interventions based on image RRs for examinations taking into consideration the department-specific variations and imaging protocols used.

3.4 "Shamma, Alshehhi, -Assessment -of image -rejection -in digital –radiograph (2023)"

Rejects, deletions, and repeated images in radiological imaging raise concerns regarding professional and ethical standards, highlighting potential shortcomings in quality control. A rejected image is an unacceptable radiograph with inadequate diagnostic value regarding image quality, evaluated by technologists based on technical qualities. The survey findings revealed common reasons for the repetition of patients' examinations. The primary cause, identified by 48.4% of radiographers, was positioning error, consistent with previous research where positioning accounted for the majority of rejected images (67.1%). highlighting the importance of proper patient instruction to minimize positioning errors. The next most common reason, identified by 21% of respondents, was artifacts. his research has provided valuable insights into the factors contributing to the repetition and retaking of images in radiology departments. The findings highlight the prominent role of positioning errors and artifacts as common causes of image retakes. Moreover, night shifts and workload affect radiographers' performance, which leads to a high possibility of retaking images. The most common artifacts that led to retaking images were motion artifacts due to the patient's movement. The second most common type of artifact is the presence of radiopaque objects within the images, which can result in misdiagnosis.

3.5 "Seyyed Amir Moradian, Hamed Zamani, Saman Dalvand Dalvand An-Analysis-of the-Rate-and-Reasons-for-Rejected–Radiographs-in-Emergency-and-Non-Emergency-Radiology-Departments (2023)"

As a crucial part of diagnosis and treatment, emergency radiology departments in trauma hospitals that serve patients around the clock have aided emergency medicine specialists and trauma surgeons. One of the key objectives of emergency radiology departments is to employ imaging to boost diagnostic accuracy and, as a result, treat acute or injured patients. In the interests of providing specialists with diagnostic images as rapidly as possible and in the greatest quality during Mass Casualty Incidents (MCI), the emergency radiologist must be able to oversee the quality of imaging in that department. This cross-sectional study was conducted in Yasuj, Iran, in the accident and emergency (public practice) and non-emergency (private practice) medical imaging departments over the course of 14 days in February 2019. A total of 7,006 images were collected from the seven

X-ray rooms which included two emergency (round-the-clock) and five non-emergency (day) departments. The rate of rejected images in the current study was 2.1%, which is acceptable in comparison to prior studies. Errors in patient positioning and motion were the most common sources of rejected radiographs. It is suggested that radiologists regularly evaluate the rate and reason for rejecting radiographs in order to improve the radiology department's efficiency. Moreover, radiologists can contribute to improving radiographers' ability to discern the clinical value of radiographs by structuring training sessions to avoid unnecessary repetitions. Regular X-ray training courses could also be beneficial for practicing proper patient positioning. To ameliorate the workload of the department, it is advised that trauma hospitals expand the number of imaging devices and staff.

3.6 "Elin Kjeloth *and Catherine chilanga-Assessment-of-image quality-on-radiographers-reason- rejecting-image-. (2022)"

A radiographic image is accepted as good qualities are satisfied, and the image considered of diagnostic value. Rejects and subsequent retakes of radiographic image expose both patients and radiological personnel to unnecessary ionizing radiation. During radiological procedure, patients' motion positioning, artifacts unique to the image receptor technology can result in repeated images. The radiographers considered the lack of fulfillment of image criteria as a reason for rejecting an image whereas diagnostic capability was an important reason for keeping images of low quality. Norway rejects more image based on lack of fulfillment of images criteria than their international colleagues.

3.7 "Alaa Ibrahim Ahmed*, Ahmed Ali Babiker, Sayed Mansour Abbas, Norah Alsulayyim , Ghada bin Duos , Ghadeeer Alanazi, Maram Almuhanna , Hissah Alotabi , Alanoud Almawashn -Reject Analysis - in –Digital- Radiography- Prospective- Study- (2022)"

Diagnostic imaging using X-rays represent the common examinations in medicine, account for the most remarkable artificial source of radiation exposure to the population in diagnostic imaging, one of the main goals of a quality assurance (QA) program is to produce consistent high-quality radiographs at a minimum exposure to the patient. A prospective study was conducted in the

radiology department of different hospitals in Riyadh. Saudi Arabia. KSA.A 100 x-ray images were collected and reviewed from March 2022 to April 2022 and it shows different issues that become the reason for this image's rejection. The need for reject analysis has been challenged by the introduction of digital radiography (DR) because of low reported reject rates and because criteria for improperly exposed images were lacking. The main advantages of reject/repeat rate analysis are enhanced department skills, lower department costs, and lower patient doses. As the number of repeats remain low, the proportion of time which patients should go through undertaking imaging procedures declines. The study has shown that, the highest reject rate was for chest exams and the most frequent causes for rejection are collimation, position and anatomical side marker further training programs are needed to minimize positioning errors and thus making a significant contribution in reducing the rejection rate. The goal is to maintain the continuity of quality control efforts in DDR and to sustain training programs for the technicians in order to ensure reliability in the diagnostic evaluations and to reduce the repeat/reject rate.

3.8 "Yazeed Alashban, Nasser Shubayr, AbdulraA. Alghamdi, SamiA. Alghamd, Sami, Boughattas-Reject- analysis-Reject-rate-Medical-imaging (2022)"

Diagnostic medical imaging provides valuable diagnostic information of the human body regarding normal and abnormal anatomy). Diagnostic procedures account for more than 95% of medical exposure to radiation worldwide ((1991) Recommend ratio, 1991. The optimal objective of radiography is to illustrate radiographic anatomical features of the examined area, including patient orientation, and to record patient details and the date of examination, while delivering the lowest possible dose of radiation to the patient. This study aimed to investigate medical image reject rates and to highlight issues within the medical imaging departments that require optimization. To this end, we recognized some limitations in the performance of the department as well as the existing process of image rejection, allowing us to propose some recommendations to enhance performance and to improve future reject analysis. This analysis has addressed the research goals and identified an overall reject rate of 8.96%. For fixed and portable radiography, pelvic and thoracic spine procedures had the highest reject rates, respectively, with the most common reasons for image rejection being positioning errors and anatomical cut-off. Additionally, the projections with the highest reject rates for fixed and portable radiography were the shoulder axial and lumbar spine

cross-table lateral projections, respectively. Moreover, the more experience and training the technologists had, the lower their image rejection rates. We recommend initiating more consistent criteria for image quality along with a feedback scheme within the medical imaging department to guide internal education programs.

3.9 "E. Kjelle, A.K.Schanche, L.hafskjold-To-keep-or-reject-on-radiographers-assessment-of plain radiography-image. (2021)"

In the study, we found that for the image initially assessed as a good quality, radiographers or technologists highly agree on acceptability. However, for images of lower quality radiologists kept a significantly higher proportion of the image. radiographers reported suboptimal collimation as main reasons for rejection three times more often compared radiologists representing the most prominent difference in use of specific causes for rejection between the two groups. In this study, a survey was conducted using a semi structured questionnaire. respondents from four different hospitals in the same hospitals trust were invited to participate. An information meeting was arranged at each hospital before distributing the online survey by email January/February 2020.

3.10 "Fathi Awad, Fathalrahman Al Naem, Afrah Gemea, Nehad Wedaa, Zeinab Mohammed and Samah Tag Elser-- X-Ray –Film-Reject-Analysis-in Radiology- Department (2021)"

Diagnostic imaging using X-rays represent the common examinations in medicine, account for the most remarkable artificial source of radiation exposure to the population. The two major methods for restricting the radiation doses to patients in medical imaging are to avoid unneeded examinations as well as to make sure the doses from examinations are no larger than required. In addition, the objective of a radiological examination should be to create images of sufficient quality for the clinical task, not images of unnecessarily high quality if that raises the radiation dose to the patient. However, using too low a dose can also be detrimental, if it ends in images that cause a clinical error or needs to be repeated. This study was conducted in the four major hospitals in Port Sudan namely: (Port Sudan Teaching Hospital (PTH), Sea Ports Corporation Hospital (SCH), Police Hospital (PH) and Bawareth Hospital (BAH). The study has shown that the highest rejection rate was for chest exams and the most frequent causes for rejection are position and under exposure. Quality images of

X-rays are found to be related to quality control measures, perfect selection of exposure factors during radiography and patient position. Hence, it is recommended that, investigation of the rejected films should be carried out regularly as part of the overall quality assurance program of the hospital in order to determine the significance of the problem and also to discover the causes.

3.11 "Brittany Stephenson-Smith, Michael J Neep, Pamela Rowntree multiple repeats, reject analysis- reject rate, X-rays (2021)"

The largest source of manmade ionizing radiation exposure to the public stems from diagnostic medical imaging examinations. Reject analysis, a form of quality assurance, was introduced to minimize repeat exposures. The purpose of this study was to analyze projection-specific reject rates and radiographic examinations with multiple rejects. A retrospective audit of rejected radiographs was undertaken in a busy Australian metropolitan emergency digital X-ray room from March to June 2018. The data were collected by reject analysis software embedded within the X-ray unit. Reject rates, and reasons for rejection for each X-ray projection were analyzed. The findings of this study demonstrated that projection-specific reject and multiple reject analysis in digital radiography is necessary in identifying areas for quality improvement which will reduce radiation exposure to patients. Projections that were frequently repeated in this study were horizontal beam knee and horizontal beam hip. Future research could involve re-auditing the department following the implementation of improvement strategies to reduce unnecessary radiation exposure. It was identified that some projections yielded reject rates as high as 50.0% and multiple reject rates as high as 12.1%. The reject rates were used concurrently with the reasons for rejection to highlight areas of clinical concern. Projections with high multiple reject rates were noteworthy as radiographers could not correct the issue After one attempt.

3.12 "Saade, C., Siblini, L., Karout, L., Khalife, S., Hilal, more H., Abbas, S., & Naffaa, L.-To repeat or not to repeat: Radiologists demonstrated decisiveness than their fellow radiographers in reducing the repeat rate during mobile chest radiography (2020)"

Radiologists and radiographers play a complementary role in providing an optimal image quality with decrease radiation dose and proper diagnosis during chest radiographs. We aim Investigate

years of experience among radiologists and radiographers on perception of image quality and its impact on repeat rate when evaluating portable pediatric chest radiographs. This retrospective study was approved by the institutional review board at our institution and patients' Consent that was informed was not followed. Pictures of pediatric mobile chest radiographs (n =131) were taken from the picture archiving and communication system (PACS) at random. Radiographers (n = 4) and radiologists (n = 4) evaluated the images. The participants' years of experience ranged from one to twenty-two years. Radiologists (88.4%) significantly assessed images as great compared to radiographers (11.6%), whereas radiographers (90.1%) substantially rated images as poor compared to radiologists (9.9%) ($p < 0.05$). Repetition: A higher percentage of radiologists (57%) than radiographers (43%) chose not to repeat images ($p < 0.05$) Image technique: radiographers (84%) evaluated image technique as poor significantly more than radiologists (16%), while radiologists (65%) rated images as acceptable and excellent (97.7%), respectively, significantly more than radiographers (35% and 2.3%, respectively) ($p < 0.05$).When it came to lowering the repetition rate of portable pediatric chest radiographs, radiologists showed greater decisiveness than their radiographer colleagues. It's interesting to note that radiologists' evaluation of image quality and technique only seems to be impacted by years of expertise.

3.13 "Neep, M., Atkinson, S., and Starkey, D-.An Australian emergency imaging department case study on reject rate analysis in digital radiography (2020)"

It serves as a foundation for identifying the reasons behind rejected images, aids in radiographer training, streamlines department operations, and eventually lowers patient dose. This was the first study conducted in Australia that looked just at DR reject rates without taking into account CR. With a sizable data set of 90, 298 photos, this robust reject analysis produced an average reject rate of 9%. It's interesting to note that certain anatomical locations produced reject rates as high as 17% when rejected images of individual projections were examined. This draws attention to a possible source of worry. Reducing departmental rejection might benefit from further training that concentrates on these particular projections. 3.14 rates with a lowering dose for the patient. Additionally, it was discovered that radiographers may have different standards for image quality, which might be raised with frequent feedback to ensure that the technical aspects and picture quality that one radiographer and radiologist deems diagnostic are the same. The study's objectives have been met, and during the

course of its 15-month inquiry, an average reject rate of 9% was discovered. It was discovered that a single % was an imprecise depiction of the department's performance, and that a more thorough evaluation of each radiographer's predictions and reject rates was both essential and productive in lowering patient dose and reject rates. The authors advise medical imaging departments to create consistent picture quality criteria and to regularly do reject analysis as a tool for instruction and feedback. To monitor and lower patient exposure to ionizing radiation, exposure index data collection would be beneficial for future research to reject analyses specific to DR.

3.14 “Khalid, javascript:; "Alyousef;, Shatha" javascript:; ",javascript:;" Alkahtani; m, "Alessa;Hajar" javascript:; "javascript:;" Alruweili-Radiograph Reject- Analysis- in -a Large –Tertiary- Care- Hospital in Riyadh (2019)”

One of the primary objectives of a quality assurance (QA) program in diagnostic imaging is to consistently generate high-quality radiographs with the least amount of patient exposure. A supplementary component of the radiology department's quality assurance procedure is reject analysis. Due to quality concerns, a sizable portion of radiographs taken may be rejected. Every year in the United States, 8% of radiographs are rejected for various reasons. After their first x-ray radiographs are rejected for various reasons, including poor image quality, artifact, anatomy cutoff, patient mobility, and equipment malfunction, patients may have additional x-ray examinations. The An electronic rejection system was specifically designed to examine rejected radiographs over a five-year period. A certified radiologist makes the rejection and sends an electronic message to the technologist in question. An essential component of every modern radiology department's quality control is reject analysis. The Kingdom of Saudi Arabia currently lacks adequate documented statistics on reject analysis. Whether or not a hospital is a teaching hospital, as well as whether it is a general or specialty hospital, will determine the quantity and kind of rejected radiographs. It will also rely on whether digital or analog equipment is available at the facility. An effective way to gather and examine the reject rate is through the suggested electronic communication of the rejection grounds. It is advised that in order to identify staff skill gaps and develop suitable training programs, a periodic evaluation of the rejected radiographs should be conducted as part of the hospital's overall quality assurance program.

3.15 "Walz-Flannigan, A. I., Brossoit, K. J., Magnuson, D. J., & Schueler, B. A.Pictorial Review of Digital Radiography Artifacts. Radiographics, (2018)"

A feature on a picture that is not consistent with the physical characteristics of the subject being imaged is called an artifact, and it can complicate or obstruct how that image is interpreted. Examples of artifacts from digital radiography systems based on flat-panel detectors are shown in this article. In order to help in the future identification, resolution, or prevention of digital radiography artifacts that may influence the quality of patient care, examples of artifacts are coupled with their cause and resolution. The instances of artifacts that were presented came from both standard quality control tests and clinical imaging. The image processing techniques and parameters that are employed by various digital radiography (or computed radiography) systems vary greatly from one another image artifacts can restrict or complicate viewers' ability to consistently see the imaged anatomy. These artifacts can be caused by image processing failures or a significant lack of robustness in the outcomes of image processing. The radiologist's ability to be certain that the information in the images is accurate and does not refer to an artifact rather than the anatomy of the patient is crucial, to the extent that this is achievable. Knowing radiographic artifacts visually can aid in determining when picture information cannot be relied upon. Furthermore, by comprehending the processes underlying the development of distinct artifacts, radiographic imaging consistency and quality can be enhanced by resolving or preventing their occurrence.

3.16 "Mc Fadden, S., Roding, T., de Vries, G., Benwell, M., Bijwaard, H., & Scheurleer, J. Digital imaging and radiographic practice in diagnostic radiography: An overview of current knowledge and practice in Europe (2018)"

The problem of "dose creep" in diagnostic radiography has been recognized by recent studies, which attribute it to the advent of CR and DR equipment. Radiographers have lately said that they depend on preset exposures and do not routinely adjust exposure variables for patients of varied sizes. Ulster University in Northern Ireland was consulted regarding ethical permission, which was granted. An online survey using a survey-designed questionnaire was used for the research design. The questionnaire, which focused on existing practices when employing digital imaging in clinical departments, was delivered as an email with a link embedded in it. There was a total of thirty

questions on the questionnaire: fifteen open-ended questions that allowed respondents to write their own responses and fifteen closed questions that required particular information on applying CR and DR. "Questionnaire skip logic" was used to direct respondents to particular questions on a subsequent page based on their response to a prior closed-ended question, preventing irrelevant questions from being asked. The EFRS associated educational members had a response rate of 70%, whereas the individual hospitals in 12 European nations had a rate of 55%. When imaging the chest, abdomen, and pelvis with both CR and DR digital systems, variation was found in practice. To guarantee that the ALARA principle is continuously followed, standardization of protocols and exposure parameters is necessary, as suggested by the variations in education, training, and practice. Operators must possess a solid understanding of every technical aspect of digital radiography with regard to image quality and patient dosage.

3.17 "D.I.Jwanbot, U.A.I.,Sirsena, F.D, Akpolile, T.S, Tungtur, & P.M.N-Analysis-of-reject-on-radiographic- film-as-aquality-element-in-diagnostic-radiology(2017)"

It has turned out that the discovery of X Ray is advantageous. Medical diagnosis and treatment have made extensive use of these advantages. Both quality assurance programs and quality control techniques are crucial for producing anatomical structure images of sufficient quality for diagnostic purposes. procedures for maintaining, testing, and monitoring the individual X-ray system components are known as quality control procedures. One of the key elements in producing a high-resolution photograph of good quality is a precise exposure rate. An photograph with high resolution is one that clearly displays the structural elements. The resultant impacts depend on the systems which are developing at the time of exposure. One of the key elements that contributes to a high-resolution image of acceptable quality is an accurate exposure rate. Overexposure produces a dark film with lower resolution, while underexposure produces a soft film that loses information. A person's health is impacted by both the kind of radiation they are exposed to and the route via which they are exposed. Additionally, fetuses are extremely radiation sensitive.

3.18 "v.k.Gyasse, N.B.Akaagerger, d.k.kakiand, I.A. Philip Analysis of reject oradiographic film as a quality element in diagnostic radiology (2017)"

The effects that follow rely on the systems that are evolving at the moment of exposure. An correct exposure rate is one of the essential components that results in a high-resolution photograph of acceptable quality. Underexposure results in a soft film that loses information, while overexposure creates a dark film with reduced clarity. The type of radiation that is exposed to and the path it takes have an effect on an individual's health. Fetuses are also particularly vulnerable to radiation.

3.19 "Mohd Yusmiaidil Putera Mohd Yusof *, Nur Liyana Abdul Rahman, Amiza Aqiela Ahmad Asri, Noor Ilyani Othman, Ilham Wan Mokhtar Digital Radiographic Image Enhancement (2017)"

Rejects, deletions, and the consequent repeat capturing of diagnostic X-ray images impose professional and ethical issues within radiological imaging. Such actions waste medical resources for the institution's quality assurance, require more, frequently needless processing and people resources, and show inadequate quality control. Therefore, it is essential to decrease the number of repeat photos taken in order to minimize X-ray exposure and discomfort for patients. The repeat rate in medical imaging performed by qualified radiologists and/or radiographers has generally been between 5% and 12%, according to a large body of literature on repeat/reject analysis. But in our study, undergraduate students who were still completing their training made up the focus group, and they were especially interested in dental imaging. Consequently, the high repetition rate—51.9% in the working length estimation during endodontic procedures, need to be carefully examined and interpreted. The study's repetition rates were quite high, particularly for several clinical procedures, which calls for optimization and radiation protection training. To improve quality assurance and provide patients with high-quality healthcare, repeat analysis should be carried out periodically.

3.20 "Zewdu, M., Kadir, E., & Berhane, M. Analysis-and-Economic-Implication-of X-Ray-Film-Reject-in- Diagnostic-Radiology-Department (2017)"

The accuracy of the diagnostic procedure is significantly influenced by the quality of a radiography image. Information regarding the internal anatomy and physiology of the human body is provided via diagnostic imaging. As a result, understanding this image correctly is crucial to taking future action. From September 2015 to December 2015, a four-month cross-sectional hospital-based study

was conducted in the radiology department of Jimma University Specialized Hospital (JUSH). Every week, a total of 6563 films were taken out of the two X-ray rooms. In a radiology department that offers radiography services, reject analysis is a crucial component of quality assurance programs to guarantee a decrease in the causes of rejects in order to lower expenses, workloads, and radiation exposure for staff and patients. To determine the primary cause of film rejection and to compute the average reject rate, a critical review of rejected radiographs is conducted. The results of this study indicate that the department's overall and individual reject rates were both greater than the acceptable range. These results could be attributed to machine malfunctions, technical operator restrictions, or the lack of a quality control program. It is recommended that the department create regular, well-documented procedures for quality assurance and control.

3.21 "Nose, H., & Shiraishi, J.Clinical utility of ultra-low dose pre-test-exposure to avoid-unnecessary- patient-exposure-due-to-positioning-errors:-a-simulation-study(2017)"

By reducing the frequency of retakes of images due to overexposure or underexposure in general radiography, the adoption of digital radiography systems enables a reduction in patient dose (equivalent to 33–50% in chest radiography). Because a real-time picture inspection on the console table is convenient, digitalization is likely to result in more radiography examinations and image retakes due to patient placement problems. In addition to photos, some patients had also uploaded. Between October 2012 and October 2013, a total of twelve radiography technicians performed radiographic exams. Beneo (Fujifilm Medical, Tokyo, Japan) was the digital radiography system utilized in this database. It was outfitted with a digital amorphous selenium FPD. The talks above suggest that it is incorrect to think that in every situation, the pre-test exposure approach is appropriate. Nonetheless, there are benefits to the suggested approach as well, like better patient placement, lessening patient mistrust of radiography due to image retakes, and shorter examination times. The study's findings showed that when the image retake rate for the particular radiological procedure is high—22.7% or higher—the suggested method, which uses a pre-test image, has the potential to lower the overall exposure dose for all patients by about 8%.

3.22 "Chih-Sheng Lin Po-Chou Chan, Kuang-Hua Huang, Chun-Feng Lu, Yung-Fu Chen and Yun-O Lin Chen, Guidelines for reducing image retakes of general digital radiography

(2016)"

Retaking radiological exam images not only puts patients at greater danger of radiation exposure, but it also wastes medical resources and lowers hospital service quality. In order to establish guidelines to lower the rate of image retakes, this study set out to identify the factors influencing general digital radiography image retakes. Analysis was done on 98,503 general X-ray pictures that were taken from a medical center in central Taiwan's picture archiving and communication system database. According to the findings, the overall retake rate was 4.89% with Chest examination revealed the highest incidence of image retakes (1544 instances), with position mistake (56.05%) being the primary cause. Conversely, out of all the exam kinds, the skull/face had the highest retake rate (9.81%). Appropriate guidelines were created once the elements influencing the image retaking rate were identified. After the rules were introduced, the rate of retakes of images was dramatically decreased, falling to 3.57% and 4.38% after one month and six months, respectively. To sum up, picture retake analysis is a useful tool for digital radiology quality assurance and serves as an indicator of quality. Frequent examination of retaken images helps identify the factors that lead to retakes.

3.23 "Hofmann, B., Rosanowsky, T. B., Jensen, C., & Wah, K. H. C. Image rejects in general direct digital radiography (2015)"

Rejects, deletions, and subsequent retakes of diagnostic X-ray images present problems from a professional and ethical standpoint for radiological imaging; additionally, they waste staff and processing resources, show inadequate quality control, and expose patients to needless ionizing radiation and additional discomfort. Our findings indicate a deletion rate that is consistent with previous Norwegian research, but considerably higher than that of studies conducted internationally on CR systems. While we discovered a deletion rate of 12.4%, Leffmann et al. found a deletion rate of 13.1% for wrist images with a CR system, while Andersen et al. observed a rejection rate of 17% for wrist images with DR. Additionally, our overall findings are consistent with the overall deletion rate of 12.5% and 7.2%, respectively, were discovered in 2009 in one of the labs that was part of our investigation and in the study by Andersen and colleagues. The results demonstrate that while the incidence of deletions is comparable to the rate of retakes with film systems, the causes of deletions

vary, ranging from improper exposure to improper placement. This may be a sign of lower caliber radiographer work. Comparable to earlier film-based imaging systems, the reject rate is at least as high as the delete rate. In digital systems, the grounds for rejection are very different. The idea that rejects would disappear with digitalization is refuted by this. An image that has been erased is superfluous since it doesn't aid in diagnosis. Therefore, the large percentages of removed photos have consequences for quality, management, education, and training.

3.24 "J. Mount- Repeat imaging due to 'rejects' is a common problem in any radiology department (2015)"

Most needless patient radiation doses are caused by "rejects," which is a frequent issue in any radiology department that involves repeat imaging. Radiographers typically reject images because of subjective judgments about image quality and gaps in diagnostic information. While radiologists and radiographers share the objective of using medical imaging to accurately diagnose patients in order to guide the course of treatment, the current investigation revealed a stark difference in the perceptions of the two professions that may result in needless repeats. According to the study's quantitative and qualitative analysis, radiologists would accept four out of five photographs on the psychometric scale, compared to radiographers' acceptance of only two. The dispute is the main cause of this disparity in the assessment standards applied by every group, for example, diagnostic versus technical proficiency. It has been discovered that the technical features of the image that radiographers prefer cause images that might otherwise give radiologists the information they need to make an accurate diagnosis to be rejected too soon. The purpose of this study was to ascertain whether radiologists and radiographers had different opinions about image quality and how this affects reject rates.

3.25 "Nicholas Taylor-The art of rejection: Comparative analysis between Computed Radiography (CR) and Digital Radiography (DR) workstations in the Accident & Emergency and General radiology departments (2015)"

Since CR and DR imaging systems have replaced traditional plain film, they have helped with reject film analysis. This is because the software installed on workstations allows the user to specify the

criteria for rejecting films. In addition, data in spreadsheet format may be produced, offering details like the total re-exposure ratio and the quantity of rejects for each anatomical region. Since the raw data from the workstations is kept on a central server, the analytic criteria employed for the study gives summary data for convenience of interpretation and distribution within the department, but it does not preclude the possibility of more in-depth analysis. However, because the rejection criteria may not have been chosen correctly, data reliability cannot be completely assured. the image rejection point, elements that are comparable to those mentioned by other writers. With the ability to tailor rejection criteria to provide as much or as little information as needed by the user, and the ability to create user-defined spreadsheets and charts that can analyse a single radiographer's performance if all users are listed on the CR and DR systems, the availability of reject analysis data in exportable formats can contribute to a reduction in the overall time taken to review reject films.

3.26 "J. Owusu-Banahene, E.O. Darko, F. Hasford, E.K. Addison, J. Okyere Asirifi - exposure-X-ray - examination - Image quality - Film reject - Quality – assurance (2014)"

The standard of radiographic examinations in a Ghanaian teaching hospital's radiology department. According to the study, cervical spine exams in both adults and children with overexposure and patient had the greatest reject rate (57.1 ± 0.7%). Any facility where an X-ray machine is used to expose any part of the human body to radiation for diagnostic or visualization purposes is considered a diagnostic radiology facility. Different radiation dosages are administered to patients and personnel during radiological procedures that involve X-rays. A multitude of factors determine the quality of information derived from radiography. The positioning as the real causes has been investigated using film reject analysis. It has been demonstrated that low image quality from the X-ray machine leaves radiologists with insufficient data to interpret examination results about anatomical site disease. As a result, patients incur more costs, and in the end, they are exposed to situations that could be hazardous to them and should have been prevented. It has been discovered that appropriate technique factor selection during exposures, patient positioning, and quality control measures all affect the quality of picture radiography. Therefore, it is advised that, as part of the hospital's overall quality assurance program, a periodic assessment of the rejected films be conducted in order to assess the scope of the issue and ascertain its root causes.

3.27 "Usha, M., Bhargava, S., & Bhatt, S. Reject-Analysis-in-Conventional Radiography (2014)"

Even in a time when computed and digital radiography are becoming more and more important, plain X-ray radiographic examination is still a crucial component of the radiology and imaging department. About 60% of radiology departments in both government and private institutions, regardless of size, are still located in poor nations and are always outfitted with traditional X-ray machines to offer basic radiography services at a reasonable cost. The study's goal was to pinpoint the causes of a tertiary care hospital's rejection of conventional radiography. Three times a week, a prospective cross-sectional study was conducted in the UCMS & GTB Hospital's Radiology and Imaging department. over a six-month period, from December 2010 to May 2011, with 15388 radiographs taken in total. In a radiology department that offers radiography services, reject analysis is a crucial component of the quality assurance program. It guarantees a decrease in the causes that lead to rejects, which lowers expenses, workloads, and radiation exposure for staff and patients. A regular quality assurance program is necessary to maintain high-quality radiographs. This program should include routine X-ray machine calibration, with technologists paying close attention to factors that could lead to repeat X-ray film processing, as well as routine morning processing unit checks.

3.28 "Ofori, Eric Kwasi; Antwi, William Kwadwo; Arthur, Lawrence; Yeboah, Cofie Afua; Dzefi Tettey, Klenam Analysis and Economic Implications of X-ray Repeat/Reject (2013)"

The patient must be positioned correctly, the right exposure variables must be chosen, and the film processing conditions must be controlled to produce high-quality radiographs. As a result, the final image has accurate diagnosis and good image quality. With the tremendous technological progress in medical imaging over the last few decades, it is necessary to identify the best corporate or organizational structure for producing high-quality diagnostic results. Radiographers must be adept at using sophisticated machinery and sensitive to the ongoing advancements in technology in their industry. Reject analysis can be used to lower radiation exposure, cut down on departmental film costs, and save patient wait times—all of which improve service quality. To produce radiographs of superior quality. Reject analysis can be used to lower radiation exposure, cut down on departmental

film costs, and save patient wait times—all of which improve service quality. A total of 2785 radiographs from 1685 patients (85.9% adult and 14.1% paediatric) were included in the study, which was conducted in July 2011. Of them, 741 (44.0%) were men and 944 (56.0%) were women. Films that were rejected were gathered and categorised based on the rationale behind the rejection. Owing to the repeated exams, time and cost analyses were also completed. It may be possible to address the observed exposure mistake and improper patient placement while also increasing revenue savings in hospitals by implementing standardisation of protocols, consistent training in radiography techniques, and quality assurance measures.

3.29 "Manu Dhillon, Srinivasa M Raju*, Sankalp Verma, Divya Tomar, Raviprakash S Mohan, Manisha Lakhanpal, Bhuvana Krishnamoorthy Reject- analysis- in direct -digital radiography - Reject analysis in direct digital radiography Reject analysis in direct digital radiography (2012)"**

The creation of a radiograph with high diagnostic quality and therapeutic value while subjecting the patient to the lowest feasible dosage is essential to the practice of radiation protection. However, it has been established that a large number of radiographs exposed in dentistry are of mediocre or non-diagnostic quality. In order to analyze positioning faults and quality in panoramic radiography, the images evaluated in this study were taken from inactive patient files from a dental college's Department of Oral and Maxillofacial Radiology. Given that the dentists and the participants whose photos were evaluated were chosen at random, the sample can be thought of as representative of regular radiograph quality because the people who took the radiographs were not aware of this study at the time. In our investigation, placement mistakes on panoramic radiographs were shown to be somewhat common. Paying close attention to patient placement could enhance the quality of panoramic radiographs.

3.30 "Ahad Zei Nasrollah Jabbari nali, Leili Rahmatnezhad Patient –dose- from-radiographic rejects/repeats- in radiology (2012)"

A decrease in image quality may result in the patient receiving an extra radiation dosage and in needless repeat radiography examinations. Given the high degree of image quality necessary,

optimization in X-ray imaging to lower patient doses during diagnostic radiology tests is a challenging procedure. Generally speaking, the optimization procedure necessitates striking a balance between patient dosage and image quality, and it's critical that dose reduction does not compromise the image's diagnostic quality. In light of this, measures have been taken to guarantee the general public and potential radiation-exposed personnel that any dose they may receive is as low as reasonably possible—this is the rationale for the ALARA program. However, unjustified patient dosage reductions may lead to images of unsatisfactory quality. As a result, patients' yearly exposure to radiation increases due to their frequent exposure. The average repetition rate found in this study's radiography repeat data analysis was 7.20%. According to earlier research, repeat rates typically ranged from 3.5% to 19.3%. Based on the data gathered by the approach, it is clear that a variety of factors, including staff experience, radiology centre workload, the use of automatic exposure control systems (photo timers), etc., play a role in radiographic repetition. The study's findings demonstrated that errors in exposure (54%) and placement (18%) are the primary causes of radiograph recurrence.

3.31 "Whaley, J. S., Pressman, B. D., Wilson, J. R., Bravo, L., Sehnert, W. J., & Foos, D. H.Reject analysis in direct digital radiography. Acta Radiologica (2012)"

In 2010, projection X-ray equipment with modalities such as computed radiography (CR, 70 % of installed units), direct radiography (DR, 26 %), and classic screen-film (4 %) was used in an estimated 182.9 million procedures conducted in US hospital radiology departments. The technologist conducting the procedure visually evaluates each radiograph to ensure it is positioned correctly, has enough exposure, and is free of patient motion blur and other quality issues that could obstruct diagnosis. In 2010, projection X-ray equipment with modalities such as computed radiography (CR, 70 % of installed units), direct radiography (DR, 26 %), and classic screen-film (4 %) was used in an estimated 182.9 million procedures conducted in US hospital radiology departments. The technologist doing the process visually evaluates each collected radiograph to ensure optimal alignment. There was only a small degree of agreement among radiography techs regarding the problems in image quality. Due to this, there is inherent variation in the reject rates among technologists as well as in the calibre of the images that are sent to the PACS. The inter-reader agreement within each group was found to be higher than the agreement between the groups

of technologists and radiologists. Compared to technologists, radiologists were shown to be more receptive to research with limited quality.

3.32 "Andersen, E. R., Jorde, J., Taoussi, N., Yaqoob, S. H., Konst, B., & Seierstad, T.-Reject analysis in direct digital radiography (2012)"

The critical evaluation of radiographs which are used as part of the imaging service but do not play a useful part in the diagnostic process" is how reject analysis is defined. Retakes are frequently the result of rejects, which forces needless patient doses as well as higher processing and labour expenses. Therefore, the analysis of rejected images serves as the foundation for training individual technologists and provides an overview of the causes of radiography errors. The radiographer has to decide why an image should be rejected before continuing. The system automatically recorded the quantity of approved and rejected images for various X-ray exams together with the rationale for rejection. The knee, shoulder, and wrist had the highest rejection rates among body parts. The knee, shoulder, and wrist had the highest rejection rates among body parts. The percentage of rejected imaging and the number of examinations did not correlate. It's possible that the study's rejection rates were overestimated. After the exam was over, the radiographers may remove photos immediately from PACS. Getting rid of poor-quality images directly in PACS will result in an understated rejection rate because the rejection software logs all images that are submitted there as accepted images. The photos that are not part of the standard protocol are called supplemental images. If more pathology was suspected or if an image was accepted despite having little diagnostic value and resulting in a second exposure, supplementary images were obtained.

3.33 "Fintelmann, F., Pulli, B., Abedi-Tari, F., Trombley, M., Shore, M.-T., Shepard, J.-A., & Rosenthal,D. I.). Repeat Rates in Digital Chest Radiography and Strategies for Improvement (2012)"

Image repeat rate (RR) has been developed into a recognised QA metric that helps with radiation protection and technologist education. Over the course of 16 months, the RR and the reasons for repeat digital chest radiographs were recorded, and a task group consisting of information technology professionals, technicians, supervisors of technologists, and thoracic radiologists

continued to look for underlying causes in the workflow. Interventions to lower the RR were planned and put into action. The first radiological risk (RR) for digital chest radiography was 13.3% (476/3575) for installed DR systems and 3.6% (138/3818) for portable CR. RR measurement and workflow analysis were used to provide goals for instructional and technical interventions. With portable CR, the RR dropped to 1.8% (81/4476) and for installed DR, to 8.2% (306/3748) as a result of the treatments. We discovered that the RR for computed chest radiography was much lower than the RR for direct digital chest radiography. We think this is because it's so simple to get repeat photos and throw them away, which implies that RR needs to be continuously monitored. We were able to show that techniques for reducing the RR that were created during the film-based imaging era may be modified for the digital. We advise radiologists to evaluate their departmental RRs for direct digital chest radiography in light of our findings, and to take comparable actions into account if needed to get reasonable RRs for this modality.

3.34 "Tzeng, W.-S., Kuo, K.-M., Liu, C.-F., Yao, H.-C., Chen, C.-Y., & Lin, H.-W. Managin Repeat Digital Radiography-Images-A-SystematiApproach Improvement (2011)"

In radiology, repeat analysis plays a crucial role in enhancing image quality. Nonetheless, gathering the necessary data for additional research is difficult, and there is ongoing debate on the correctness of the analysis's findings. This study's primary goals are to establish a methodical methodology, enhance data gathering methods' accuracy, and repeat analysis in a fully digital environment with the aid of information technology. Reducing the amount of human resources needed to consistently maintain image quality was another goal of the study. The radiology department of a Taiwanese medical facility is the primary participant in this investigation. This report pertains to a hospital that has over 1,300 beds. It's one of the main hospitals in the southern part of Taiwan. The facility produces 384,194 images with an equal image size of 3.12 annually and performs 249,215 general radiography examinations annually. The reasons behind the repeated images and body parts were examined in this study when analysing the repeat images. Position errors, artefacts, and patient movement accounted for 79.93% of the repeat photos between January and December 2008. These factors were the most frequently cited causes of repeat images. It's possible that the recurrence rate from January to May 2008 was overestimated, but since June 2008, it has stayed below 3%. Position mistakes accounted for the highest percentage of repeat images, with patient movement, artefacts,

and position errors being the most frequent causes.

3.35 "Eivind Richter Andersen, Jannike Jorde, Nadia Taoussi, Sadia Halima Yaqoob, Bente, Konst, and, Therese, Seierstad – Reject – images – evolution – of – radiographers (2011)"

Reject analysis is described as 'the critical evaluation of radiographs which are used as part of the imaging service but do not play a useful part in the diagnostic process. Rejects often lead to retakes which imposes unnecessary patient dose and increased processing and occupational costs. As such, analysis of rejected images gives an overview of the sources of radiographic errors and forms the basis for educating individual technologists. An overall rejection rate of 12% indicates a need for optimizing radiographic practice in the department. Reject analysis has been used as a quality indicator for many years. Previous reject/retake analyses have been performed mostly in film-based radiology departments and in departments using CR systems. In the present reject analysis, performed in two direct digital radiography laboratories, the overall rejection rate was 12%. The main reason for rejects was patient-positioning error. When rejecting an image, a rejected cause had to be selected prior to continuing the examination. Also, no pre-selection of single examination types or patient groups were performed.

3.36 "Shetty, C. M., Barthur, A., Kambadakone, A., Narayanan, N., & Kv, R.Computed-Radiography- Image-Artifacts-Revisited.-American-Journal-of-Roentgenology (2011)"

In our hospital, as in most major hospitals in India, the CR system is used for most of the hospital's general radiography workflow. Unlike the competing digital technology, CR is particularly suitable for bedside radiographic examinations, which usually are the worst images in general radiography because of the emergency conditions under which the examinations are performed. The wide latitude of CR improves the consistency of good-quality bedside radiographs. The image quality of CR on large body parts, such as the chest and abdomen, is better than that of digital radiography, whereas digital radiography is preferred for small body parts and extremities. Also, the CR system has the advantage of positioning flexibility for difficult views, because CR cassettes can be placed in any position, which is not possible in digital radiography systems. The new-generation CR systems, software- and hardware-related artifacts have decreased, making operator errors more evident. The

purpose of this study is to establish the current trend of CR artifacts and the new facets in identifying and resolving problems quickly that will help prevent future occurrences. This article also brings to light the importance of constant review required of this extensively studied topic to avoid diagnostic misadventures.

3.37 "Roohi Shalemaei, R. Films reject analysis for conventional radiography in Iranian main hospitals (2011)"

Film reject analysis is a well-established method of quality control (QC) in diagnostic radiology. The employment of reject analysis in the evaluation of image quality has quite a long history. A reject film is a film that does not add diagnostic information to clinical analysis because of poor image quality. Analysis of rejected films yields information about the efficiency of an X-ray department and is the basis for QC and education of the radiographer. This survey was done in four Iranian main hospitals in 2006. Data were collected during 4 weeks [2 weeks before the implementation of a quality assurance programme and 2 weeks after]. The QA programme consisted of the following actions: performing QC tests, doing appropriate corrective actions and training to the staff. Analysis of film rejection is an easy and inexpensive method to gain information about the performance of an X-ray department. It yields representative data for the basis of ongoing QC performance, training programmes or necessary changes in work flow. This study has given useful input into the common problems related to the radiographer skill and also recommends that a regular and continuous QA programme should be applied in order to deliver high-quality health service to patients.

3.38 "D. Waaler *and B. HofmannImage rejects/retakes radiographic challenges. (2010)"

All studies identified positioning errors to have moved from being the second most dominating cause of rejects/retakes to being the overall dominating upon introduction of digital systems, and study also indicates that positioning error in absolute numbers have slightly increased. To measure rejects/retakes in an objective manner is a challenging task. Even with specially developed software, it is difficult to obtain good estimates, as the choice of a reject/retakes depends on radiographers subjective reviews.it is therefore important to provide knowledge about how radiographers norms and standards about image quality are formed. Rejects and subsequent retakes of diagnostics X Ray

images impose important challenges within radiographic imaging. They expose patients to unnecessary ionizing radiation and added inconveniences.

3.39 "David H. Food, W. James Sehnert, Bruce Reiner, Eliot L. Siegel, Arthur Segal, and David L. Waldman Digital -Radiography -Reject Analysis, Results, (2009)"

Digital radiography systems are in use throughout the medical imaging community and now represent the standard of care at many hospitals and **imaging** centers. To date, however, there is little reported in the technical literature on the quality performance, as measured in terms of reject rates, associated with the clinical use of these systems and now represent the standard of care at many hospitals and imaging centers. To date, however, there is little reported in the technical literature on the quality performance, as measured in terms of reject rates, associated with the clinical use of these systems. Problems were encountered with the integrity and the consistency of the data that was collected from both sites. These problems resulted from a combination of factors, including limitations in commercial CR capture software and hardware infrastructure, lack of standard terminology and associated definitions for QA deficiencies, and inconsistent QA practices. Comprehensive and accurate digital radiography QA requires that a mechanism be put into place to force technologists to enter rejected data information into a database, e.g., the capture device software should require that this data be entered for each rejected image before another image can be scanned. The reject data must include the reason for rejection, technologist ID, patient ID, and equipment- and exposure-related information.

3.40 "Jones, A. K., Polman, R., Willis, C. E., & Shepard, S. J. Performing -Reject -Analysis and Exposure- Analysis - in Computed -Radiography (2009)"

Repeated and rejected images represent both unnecessary radiation exposure to patients and inefficiency in the imaging operation owing to wasted time and resources. Repeated images are inherent to projection radiography, where patient positioning and alignment are integral components of image quality. With screen–film imaging systems, the relatively narrow exposure latitude available for creating a clinically useful image sometimes necessitates repeated images owing to under- or overexposure of the film. Patient motion and artifacts unique to the image receptor

technology can result in repeated images as well. Therefore, repeat/reject analysis is an integral part of a quality assurance (QA) program for radiography. At first glance, it may seem that a reject analysis program is less useful for digital radiography, perhaps due to the stability of modern radiographic equipment and the absence of film processors.

3.41 Minnigh, T.R., & Gallet, J. Quality Control Using a Radiological Digital X-ray Dashboard Journal Digital Imaging (2008)

A prototype of the aforementioned software was implemented at a large children's hospital in the Midwestern United States. The site's CR systems included multiple Kodak Direct View CR 850s and CR 950s (Fig. 1). Not all systems at this facility were utilized for this prototype test period. The systems that were part of the study were integrated on a common network with remote operator panels (ROPs) allowing the technologist to perform the functions of identification (ID) and QC of patient images at a location remote from the CR reader itself. The digital dashboard was successful in producing reports from data acquired by remote systems and delivering them in a consolidated Excel format at a central PC residing in the imaging manager's office. Pivot tables were used to analyze the accrued results in terms of elements listed in There are 17 worksheets of data that can be used in the department's analysis by the user, with an extra worksheet containing all the data resident in the CRs captured during the last software query. The ability to drill down allows users to quickly see what needs to be addressed for productivity improvements, from the managers' desktop in the workplace. Because of this inherent distributed modality, a QC management system can be thought of as the department administrator's "digital X-ray dashboard," providing the chance for more frequent and accurate key parameter monitoring and intervention.

3.42 Waseem Akhtar, Mubashir aslam, marif ali, kashif mirza and Nadeem Ahmad Film retakes in digital and conventional-radiography (2008)

Despite exposing people to some radiation, X-rays are one of the most significant diagnostic modalities utilised in healthcare services. Similar room light and temperature conditions were used for the image evaluation. It is suggested that the increasing advancements in computer technology and the expansion of storage capacities in digital radiography systems make them more significant

in clinical practicedue to improvements in computer technology and the growth of these devices' storage capabilities. It is advised that conventional radiography equipment in radiological units be replaced with digital radiography due to the significant decrease in retake x-rays that digital radiography produced as compared to conventional radiography. Digital radiography images can be sent quickly and accurately over the internet for review or case referral to other departments and throughout the hospital. Compared to conventional radiography, digital radiography led to a significant decrease in the number of retakes of radiographs.

3.43 Prieto, C., Vano, E., Ten, J. I., Fernandez, J. M., Iñiguez, A. I., Arevalo, N., … Martinez, D. Image- Retake- Analysis -in Digital -Radiography – Information. (2008)

The Diagnostic Methods Committee of the British Institute of Radiology's Quality Assurance Working Group defines reject analysis as "the critical evaluation of radiographs which are used as part of the imaging service but do not play a useful part in the diagnostic process. Rejection rate analysis could also be done if a tag is filled on every image rejected, but this implies a thorough collaboration of all radiologists and radiographers (not easy in very busy departments). The 'natural' tendency to mask poor-quality practice or the lack of consistency of all the staff to follow the procedure to mark or classify rejected images may easily lead to underreporting or misreporting of rejected images. The incorporation of effective assessment strategies by which the level of service delivery can be measured is essential to evidence the quality of a service. Only where service levels are measured, analyzed, and remeasured after an intervention can we estimate the quality value of the intervention. One of this measurement tools is image retake analysis that facilitates a comparative measurement of aspects of service quality, providing evidence to direct staff training and education and alterations to work practice patterns that may be appropriate to improve service quality and facilitate cost effective practice.

3.44 Nol, J., Isouard, G., & Mirecki, J. J.-Digital-Repeat-Analysis; Setup-and Operation. -Journal-of Digital Imaging (2006)

Reject analysis (RA) has been one of the key quality control tools in conventional medical imaging departments using film processing technology for as long as many of us can remember. The Quality

Control in Diagnostic Imaging has been used as the bible of reject analysis in most Australian imaging departments. We also acknowledge that some departments in Australia and other countries refer to Peer et al. Repeat films were limited to those radiographs that were not accepted and required an additional exposure to the patient. Reject films were collected and controlled by the senior radiographer in charge of conducting the periodic reject analysis study. At the end of the collection period and after performing the initial sorting and analysis, the collected batch went through another sorting process by the researching team. Films were sorted into four categories: exposure, positioning, good, and miscellaneous errors. Clear, black, and fresh films were included as part of the reject analysis and not of the repeat analysis. Repeat image analysis is one of the major quality improvement tools used in imaging departments, regardless of the technology. The main challenge is to set a credible system and to work around the deficiencies of the products available in the market. Raising software enhancement requests to the manufacturer is the best approach to tailor newly setup digital systems based on the relationship of PACS, and CR systems in place.

CHAPTER - 4

MATERIALS AND METHOD

4.1 SOURCE OF DATA

The present study was conducted in the SANTOSH MEDICAL COLLEGE through google forms. It has 289 active participants.

4.2 METHODS OF COLLECTION OF DATA

An online survey was created using google form. The survey aimed to [State the primary objective of the Survey]. It included [describe the type of questions, e.g. multiple –choice] together a range of quantitative and qualitative data.

Survey platform

The Survey was administered through Google form chosen for its accessibility and automated data collection features. Google form allowed for efficient distribution and collection of responses while ensuring data integrity.

4.3 STUDY DESIGN

A cross sectional study to assess the reason for x-ray rejecting images.

4.4 STUDY PERIOD

The study was conducted over one year, starting in September 2023 and concluding in September 2024.

4.5 STUDY POPULATION

TECHNOLOGIST/RADIOGRAPHERS

4.6 SAMPLE SIZE

As per the literature review, the knowledge of 289 radiographers assessed in the Research study.

4.7 METHOD

The study was a cross-sectional questionnaire-based survey that targeted technologist / radiographers working in Delhi-NCR, 2024. All data were collected from an online survey based using google form. The study consisted of a self-structured survey divided into two sections, the questionnaire's first section included demographic information such as (age, gender, qualification, experience) .The second of the questionnaire included basic questions designed to assess participant's rejected images.

This study has two criteria:

- Inclusion criteria
- Exclusion criteria

Inclusion Criteria

Medical imaging technologists/radiographers and health professionals will be part of the study. Radiographers with good job experience knew more about the reason for the x-ray rejected image.

Exclusion Criteria

Other health professionals than medical imaging/radiography will not be part of the study. Radiographers with less job experience knew less about the reason for x-ray rejected images.

4.8 DATA COLLECTION PROCEDURE

All data were gathered through an online survey conducted via google forms. The survey consisted of a two-section multiple choice questionnaire (MCQ). Participants received 1 mark for each correct response, with no deductions for incorrect answers.

4.9 ETHICAL CONSIDERATION

The study was approved by Institutional Ethics Committee for human subject Research, SANTOSH MEDICAL COLLEGE.

CHAPTER – 5

RESULT

This cross-sectional study was conducted on a survey to assessment of x-ray image among RADIOGRAPHER/TECHNOLOGIST about Rejected X-ray images.

Data Analysis and Interpretation

The collected data were tabulated and statistically manipulated. Data was using the same questionnaire.

Table no. 1: Distributed of Study Participants According to their Gender in Years.

Parameter	Category	No of Participants	Percentage %
Gender	**Female**	159	55.2
	Male	129	44.8

Table no. 1: Shows the distribution of study participants according Gender in Years.

The median age of respondents were 25 years (IQR = 4 years). Regarding gender distribution, there is a slight predominance of females. Out of 288 participants, 159 (55.2%) are female, while 129 (44.8%) are male.

Graph no. 1: Distributed of Study Participants According to their Gender in Years.

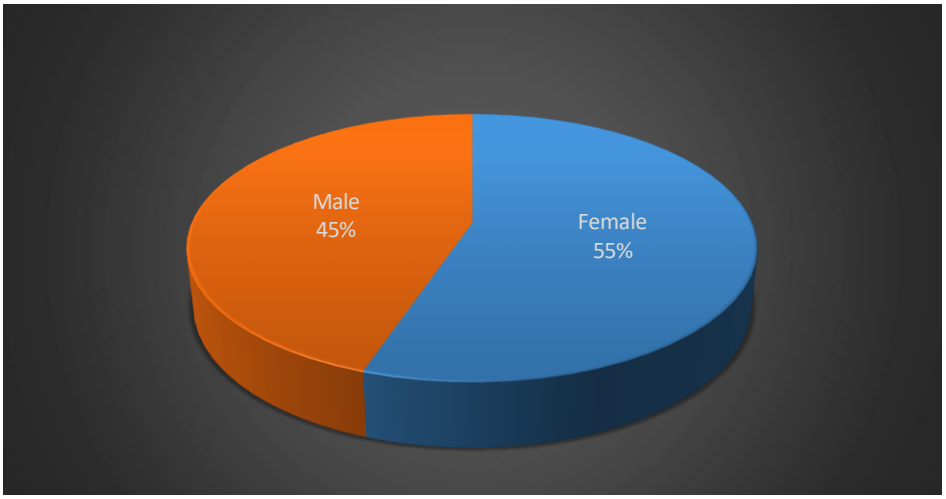


Table no. 2: Distribution of study Participants According to their qualification years.

Parameter	Category	No of Participants	Percentage %
Qualification	**Diploma**	22	7.6
	Bachelor's	145	50.3
	Master's	121	42.1

Table no.2: Shows the Distribution of study Participants According to their qualification years.

In terms of qualifications, the majority of participants hold higher education degrees. The largest group consists of those with a Bachelor's degree in MIT, accounting for 145 individuals or 50.3%of the respondents. This is followed closely by those with a Master's degree in MIT, comprising 121 participants or 42.1%. A smaller portion, 22 individuals or 7.6%, hold a Diploma in MIT.

Graph no. 2: Distribution of study Participants According to their qualification years.

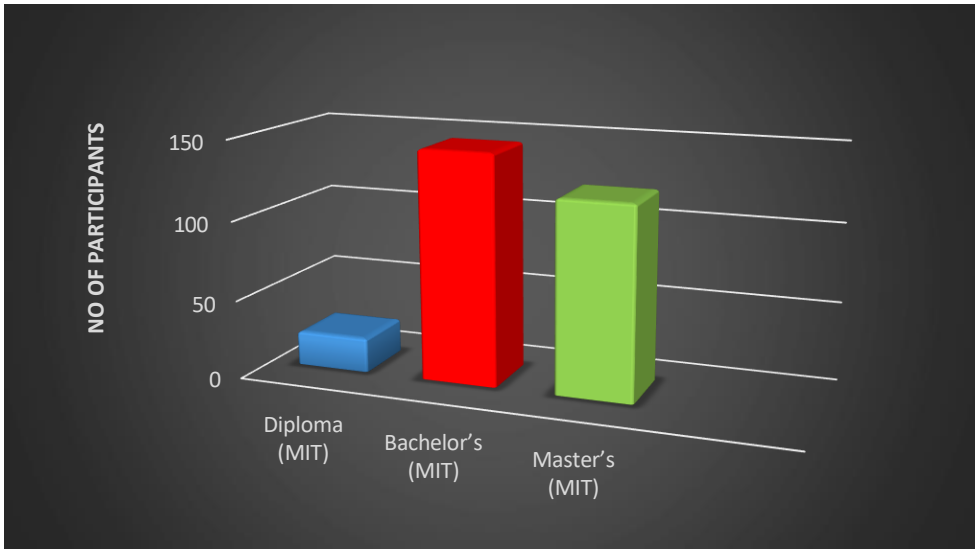


Table no. 3: Distribution of Study Participants According to their institution size in Years.

Parameter	Category	No of Participants	Percentage %
Institution Size	**University or Hospitals**	150	52.1
	Medical center or diagnostic center	99	34.4
	Regional general	32	11.1
	Other	7	2.4

Table no.3: Shows the Distribution of Study Participants According to their institution size in years.

The institutional affiliation of the participants reveals that most work in larger healthcare settings. The majority (150 participants or 52.1%) are employed in universities or hospitals. Another substantial group (99 participants or 34.4%) work in medical centers or diagnostic centers. A smaller proportion (32 participants or 11.1%) are employed in regional general hospitals. Only a small fraction (7 participants or 2.4%) work in other types of institutions

Graph no.3: Distribution of Study Participants According to their institution size in Years.

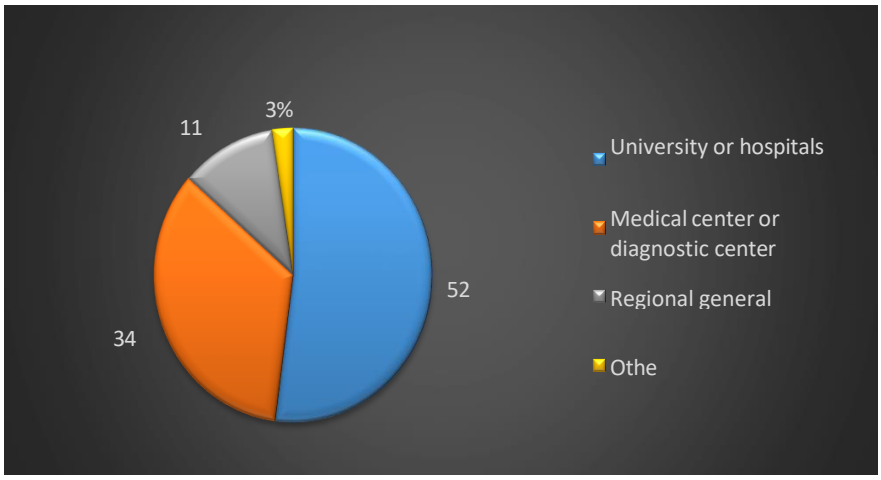


Table no. 4: Distribution of Study Participants According to their career experience in Year.

Parameter	Category	No of Participants	Percentage %
Career Experience	**Less than one year**	26	9.0
	1-10 years	235	81.6
	11-20 years	24	8.3
	above 20 year	3	1.0

Table no. 4: Shows the Distribution of Study Participants According to their career experience in Year.

Career experience data shows that the vast majority of participants are in the early to mid-stages of their careers. 235 participants (81.6%) have between 1 to 10 years of experience. This is followed by two smaller groups: those with less than one year of experience (26 participants or 9.0%) and those with 11-20 years of experience (24 participants or 8.3%). Only avery small number (3 participants or 1.0%) have over 20 years of experience.

Graph no. 4 Distribution of Study Participants According to their career experience in Year.

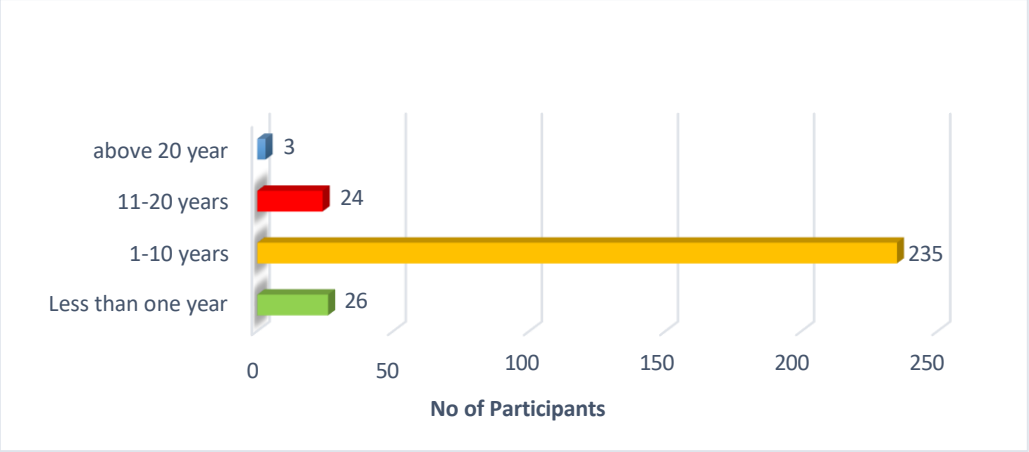


Table no. 5: Shows the Distribution Faced challenges in communicating the reason for image rejection to other team members.

Category	No of Participants	Percentage%
Yes	237	82.3
No	51	17.7

Table no. 5: Shows the Distribution Faced challenges in communicating the reason for image rejection to other team members.

A significant majority (82.3%) of respondents reported facing challenges in communicating the reason for image rejection to other team members.

Graph no. 5: Shows the Distribution Faced challenges in communicating the reason for image rejection to other team members.

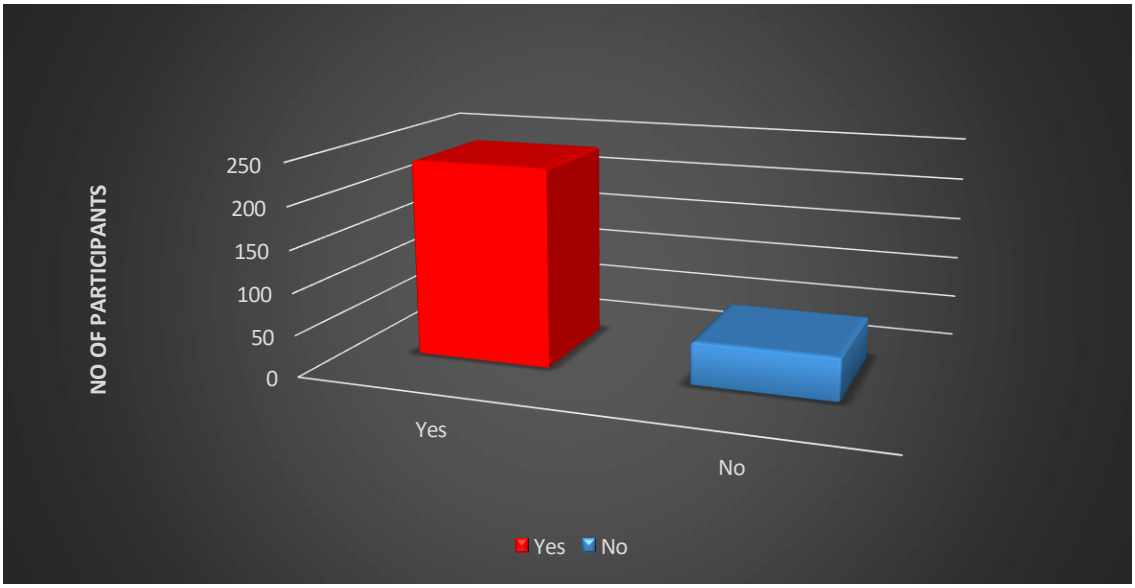


Table no. 6: Shows the Distribution Image was too dark or underexposed.

Category	No of Participants	Percentage %
Strongly agree	73	25.3
Neutral	110	38.2
Disagree	68	23.6
Agree	37	12.8

Table no. 6: Shows the Distribution Image was too dark or underexposed.

Regarding image quality, 25.3% strongly agreed that images were too dark or underexposed, while 23.6% Disagreed. Interestingly, 38.2% remained neutral on these issues.

Graph no. 6: Shows the Distribution Image was too dark or underexposed.

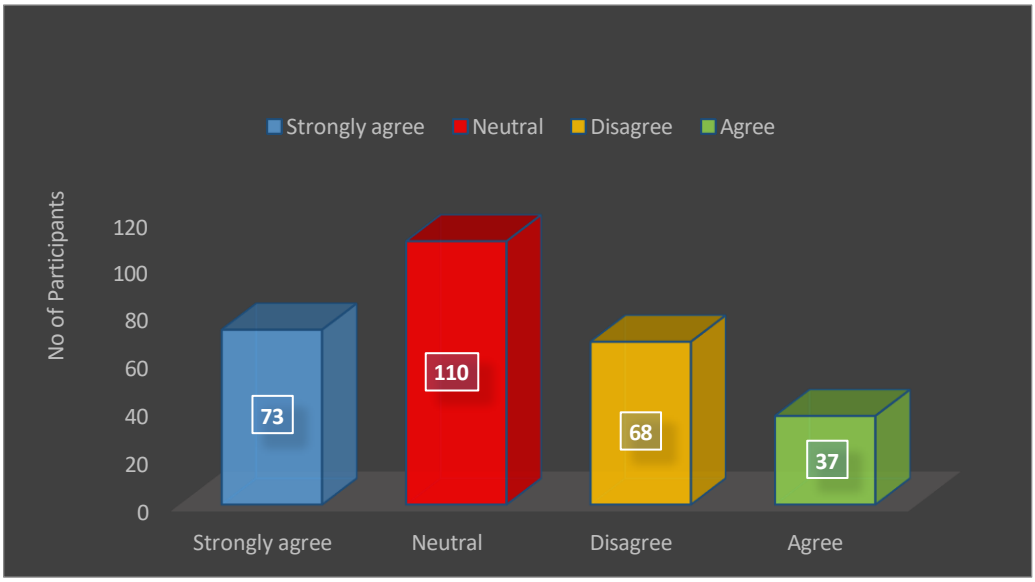


Table no. 7: Shows the Distribution Image was too bright or overexposed.

Category	No of Participants	Percentage %
Strongly agree	67	23.3
Neutral	110	38.2
Disagree	74	25.7
Agree	37	12.8

Table no. 7: Shows the Distribution Image was too bright or overexposed.

Regarding image quality, 23.3% strongly agreed, while 25.7% Disagreed they were too bright or overexposed. Interestingly, 38.2% remained neutral on both these issues and agree (12.8%)

Graph no. 7: Shows the Distribution Image was too bright or overexposed.

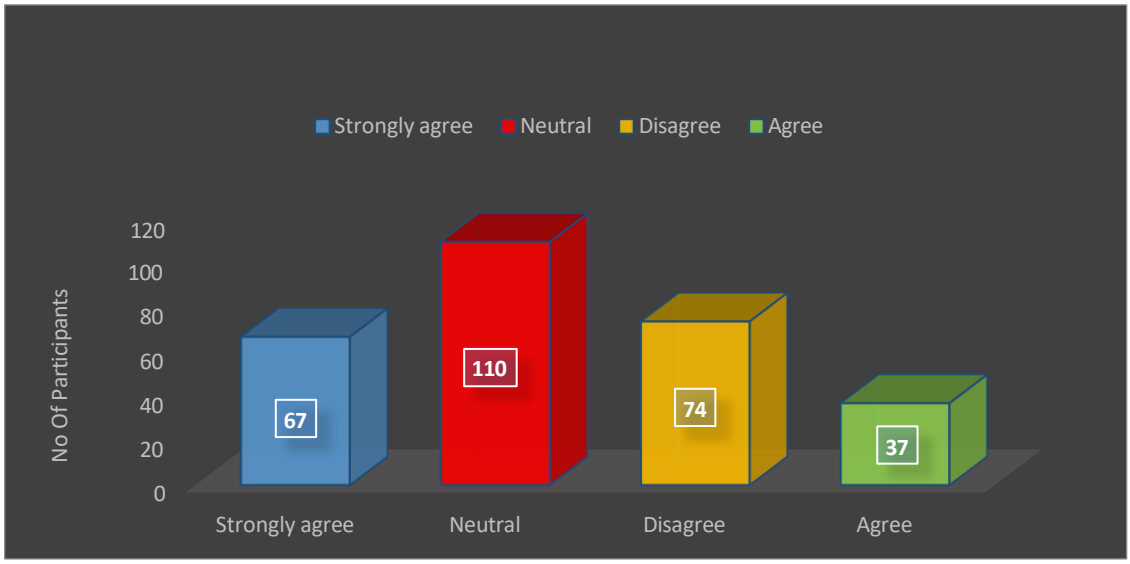


Table no.8: Shows the Distribution Reason for rejecting any x-ray images.

Category	No of Participants	Percentage%
Blurring due to patient movement	113	39.2
Improper collimation	80	27.8
Incorrect exposure	77	26.7
Over exposed.	18	6.3

Table no.8: Shows the Distribution Reason for rejecting any x-ray images.

The most common reason for rejecting x-ray images was blurring due to patient movement (39.2%), followed by improper collimation (27.8%) incorrect exposure, and over exposed (6.3%).

Graph no.8: Shows the Distribution Reason for rejecting any x-ray images.

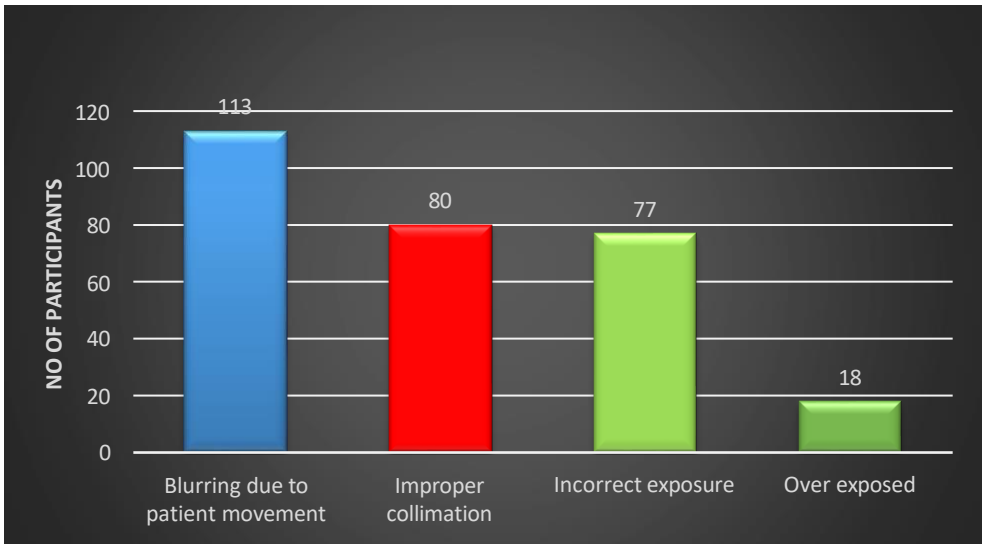
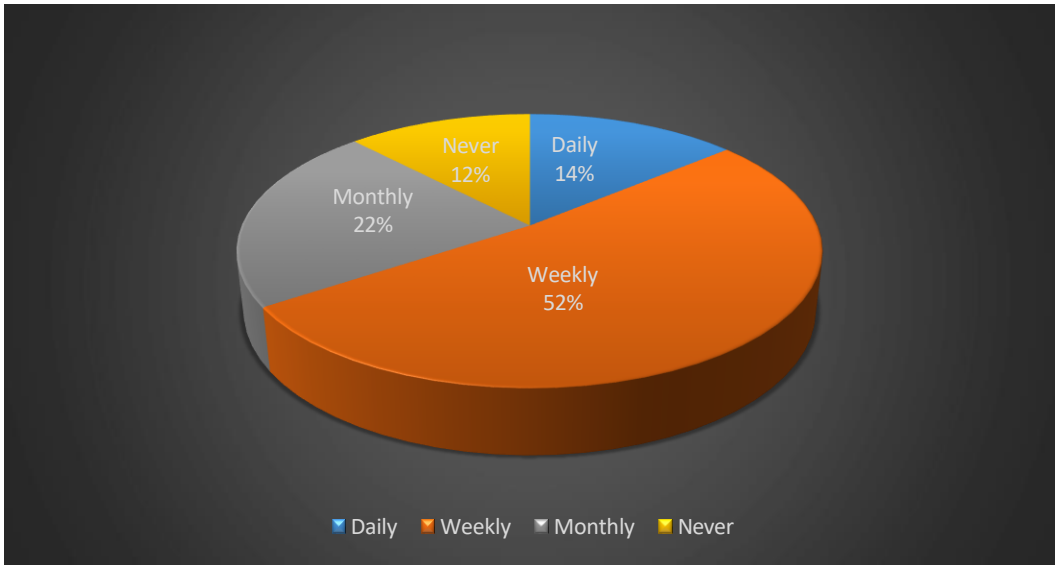


Table no. 9: Shows the Distribution Frequency of rejecting x-ray images

Category	No of Participants	Percentage %
Daily	40	13.9
Weekly	149	51.7
Monthly	64	22.2
Never	35	12.2

Table no. 9: Shows the Distribution Frequency of rejecting x-ray images.

The most common frequency of rejected images Weekly usage is the most common, with 51.7% of participants rejecting X-ray images on a weekly basis. Monthly rejection is less frequent but still significant, at 22.2%. Daily rejections are relatively rare, at 13.9%. Never rejecting images is the least common, at 12.2%.



Graph no. 9: Shows the Distribution Frequency of rejecting x-ray images.

Table no. 10: Shows the Distribution Reason for rejecting x-ray images based on their frequently or severity.

Category	No of Participants	Percentage %
Positioning errors	49	17.0
Technical issues	114	39.6
Patient movement	87	30.2
Artifacts	38	13.2

Table no. 10: Shows the Distribution Reason for rejecting x-ray images based on their frequently or severity.

Technical Issues are the most frequent, affecting 39.6% of participants, Patient Movement accounts for 30.2% of issues, Positioning Errors contribute to 17.0% of the problem, Artifacts represent the smallest proportion at 13.2%.

Graph no. 10: Shows the Distribution Reason for rejecting x-ray images based on their frequently or severity.

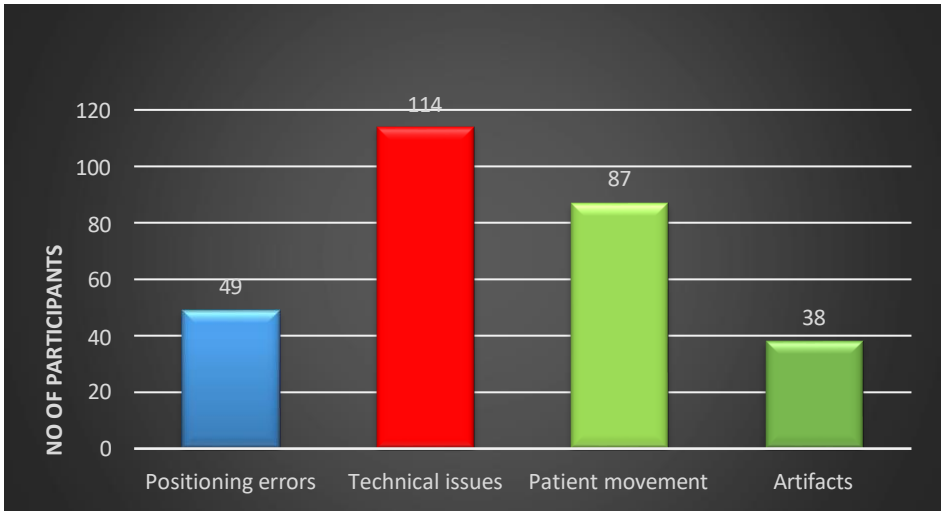


Table no. 11: Shows the Distribution Radiographers collaborate with another department to reduce image rejection.

Category	No of Participants	Percentage %
Very well	77	26.7
Neutral	79	27.4
Needs improvements	112	38.9
Effective	20	6.9

Table no.11: Shows the Distribution Radiographers collaborate with another department to reduce image rejection.

A significant portion of participants (38.9%) believe that the current situation "needs improvements, with 27.4% of participants feeling "neutral", The "Very well" category, with 26.7%, Only 6.9% of participants view the situation as "Effective".

Graph no. 11 Shows the Distribution Radiographers collaborate with another department to reduce image rejection.

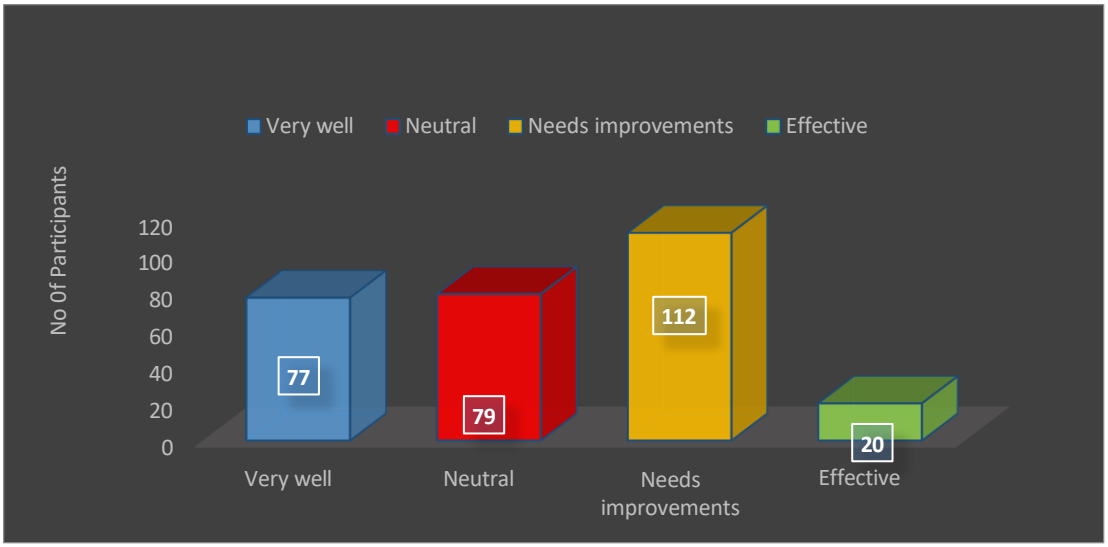


Table no. 12: Shows the Distribution Standardized process for communicating rejected images to radiographers.

Category	No of Participants	Percentage %
Yes	221	76.7
No	67	23.3

Table no. 12: Shows the Distribution Standardized process for communicating rejected images to radiographers.

The standardized process for communicating rejected images to radiographers is in place for 76.7% of respondents, indicating that while most departments have a system, there's still room for improvement. However, 23.3% of participants report the absence of such a process.

Graph no. 12: Shows the Distribution Standardized process for communicating rejected images to radiographers.

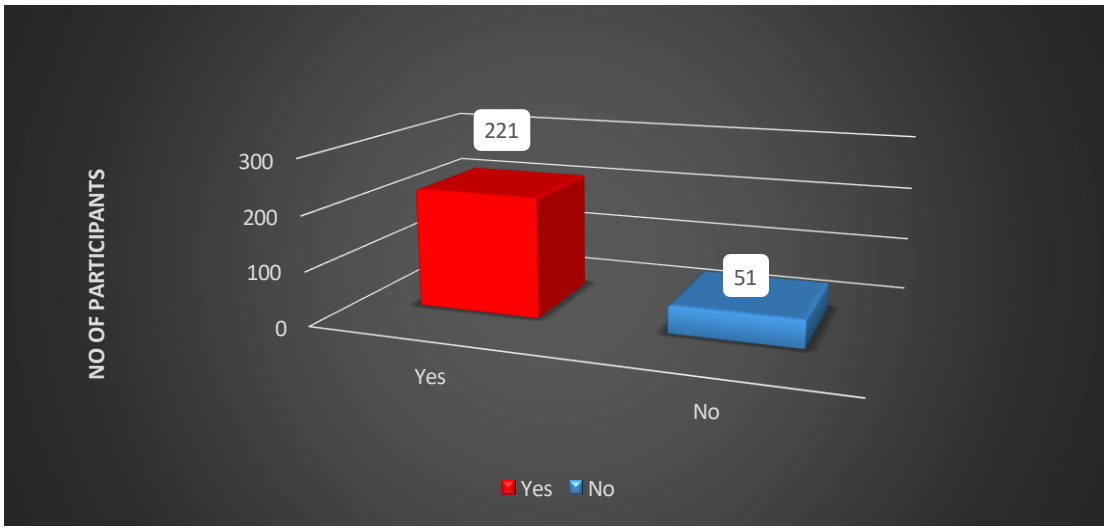


Table no. 13: Shows the Distribution Communication issues contributing of image rejection.

Category	No of Participants	Percentage %
Yes	66	22.9
No	72	25.0

Table no. 13: Shows the Distribution Communication issues contributing of image rejection.

Communication Issues: 22.9% of participants identify communication issues as contributing to image rejection, No Communication Issues: 25.0% of participants do not perceive communication issues as a factor in image rejection.

Graph no. 13: Shows the Distribution Communication issues contributing of image rejection.

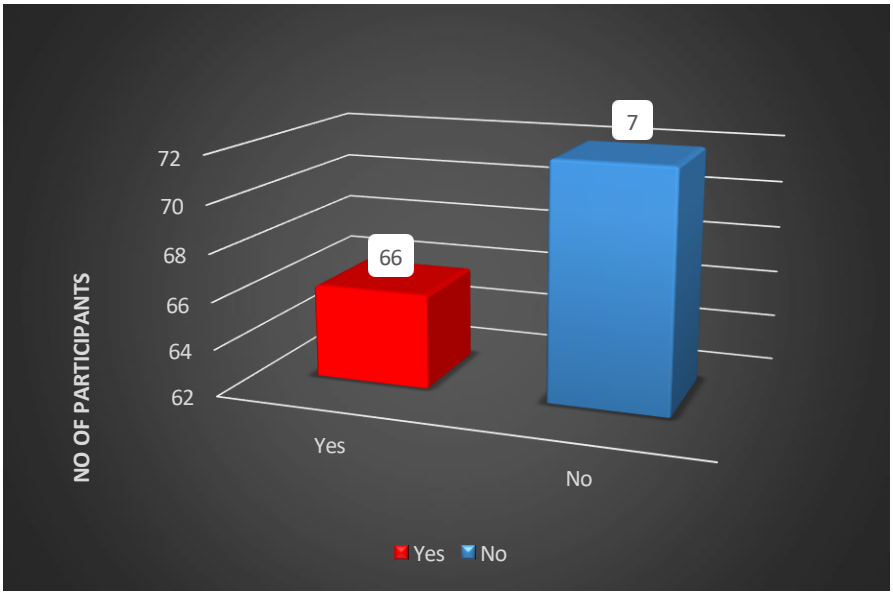


Table no. 14: Shows the Distribution Image quality artifacts.

Category	No of Participants	Percentage %
Clarity and sharpness meet standards	65	22.6
Issues with image contrast	128	44.4
Proper density and brightness	71	24.7
Consistency in image quality.	24	8.3

Table no. 14: Shows the Distribution Image quality artifacts.

Image Contrast the largest group, 44.4%, reports issues with image contrast, Clarity and Sharpness: 22.6% of participants believe that clarity and sharpness meet standards, Density and Brightness: 24.7% report issues with density and brightness, Consistency Only 8.3% mention problems with consistency in image quality.

Graph no.14: Shows the Distribution Image quality artifacts.

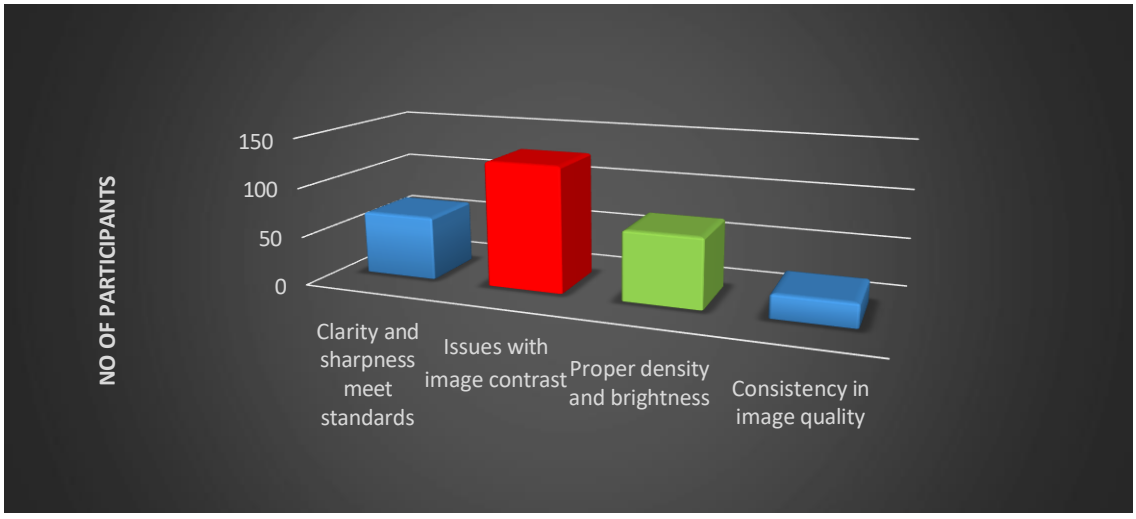


Table no. 15: Shows the Distribution Artifacts in x-ray images.

Category	No of Participants	Percentage %
Motion artifacts	117	40.6
Phantom Artifacts	67	23.3
Grid artifacts	79	27.4
Scatter radiation artifacts.	25	8.7

Table no. 15: Shows the Distribution Artifacts in x-ray images.

The most common issue, reported by 40.6% of participants, Grid Artifacts 27.4% of participants experience ,23.3% report phantom artifacts, suggesting that these artifacts, which may arise from objects or structures not related to the actual imaging subject, are a notable problem, the least reported, with 8.7%, indicates that scatter radiation artifacts are less common but still a factor to consider.

Graph no. 15: Shows the Distribution Artifacts in x-ray images.

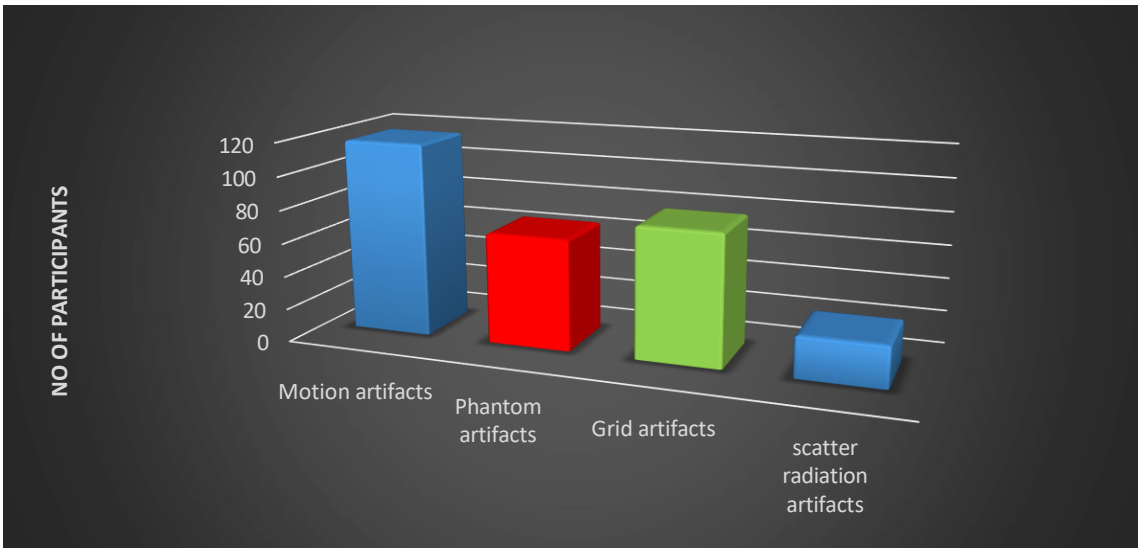


Table no. 16: Shows the Distribution Factors affecting image quality.

Category	No of Participants	Percentage %
Positioning errors	69	24.0
Patients' movements	93	32.3
Technical issues	92	31.9
Underexposure	34	11.8

Table no. 16: Shows the Distribution Factors affecting image quality.

The most significant factor affecting image quality, reported by 32.3% of participants to patients' movements, Close behind, 31.9% of participants identify technical issues as a key factor, 24.0% report positioning errors as affecting image quality, the least common factor, with 11.8%, indicates that underexposure is less frequently reported but still affects some images.

Graph no. 16: Shows the Distribution Factors affecting image quality.

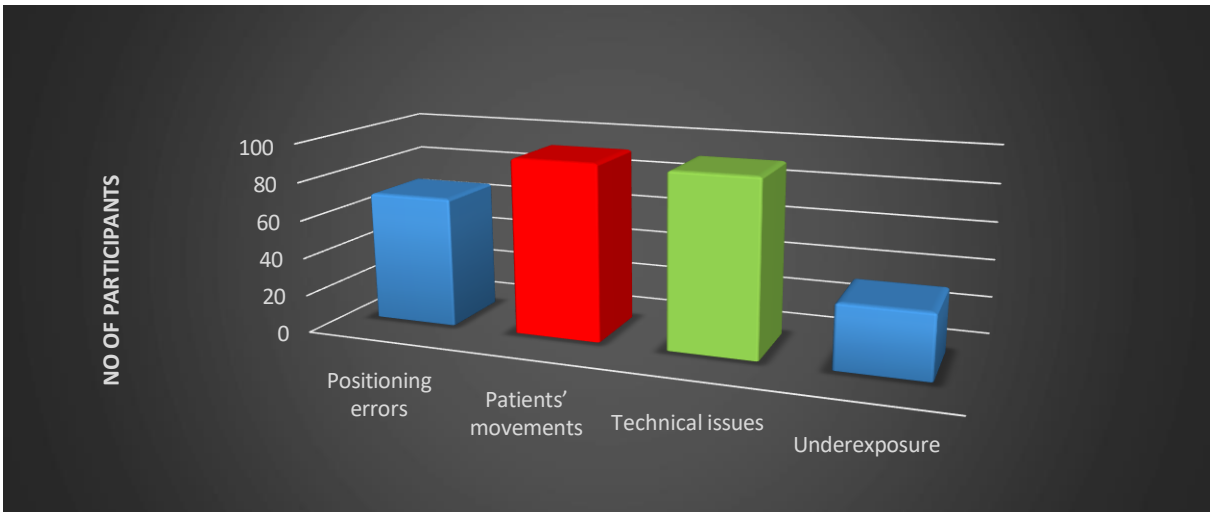


Table no. 17: Shows the Distribution Criteria to assess the overall quality of an x-ray images.

Category	No of Participants	Percentage %
Image clarity	89	30.9
Contrast	99	34.4
Detail visibility	72	25.0
Density and brightness	28	9.7

Table no. 17: Shows the Distribution Criteria to assess the overall quality of an x-ray images.

The most important criterion, with 34.4% of participants highlighting contrast as crucial for assessing image quality,30.9% of participants consider image clarity a key factor, 25.0% emphasize detail visibility, the least mentioned criterion, with 9.7%, indicates that while important, density and brightness are less critical compared to other factors.

Graph no.17: Shows the Distribution Criteria to assess the overall quality of an x-ray images.

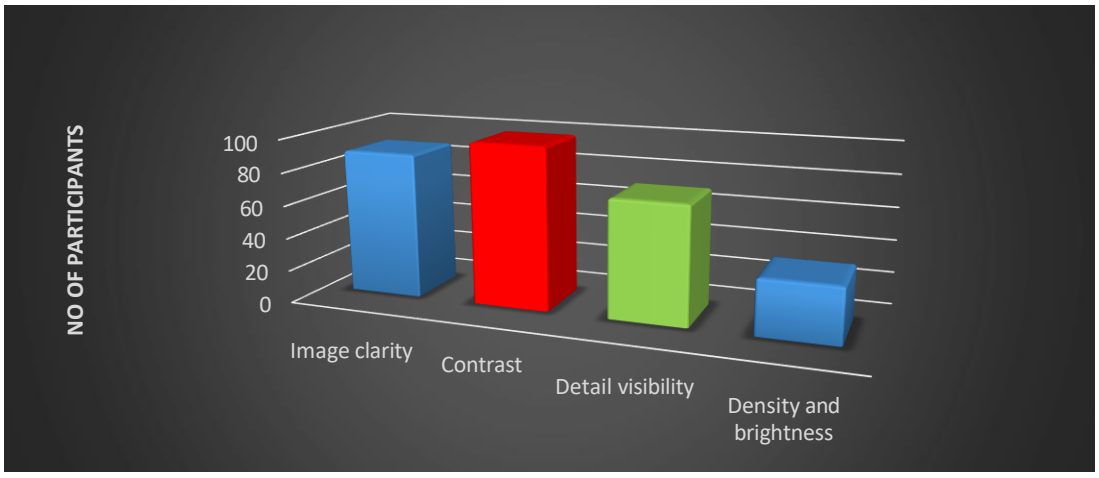


Table no. 18: Shows the Distribution The type of artifacts that are more common.

Category	No of Participants	Percentage %
Motion artifacts	107	37.2
Scatter artifacts	86	29.9
Grid artifacts	77	26.7
Phantom artifacts	18	6.2

Table no. 18: Shows the Distribution The type of artifacts that are more common.

The most common type, reported by 37.2% of participants, indicating that motion artifacts are the most frequent issue affecting X-ray images: 29.9% of participants encounter scatter artifacts,26.7% of participants experience grid artifacts, the least common, reported by 6.2%, showing that phantom artifacts are relatively rare compared to other types.

Graph no. 18: Shows the Distribution the type of artifacts that are more common.

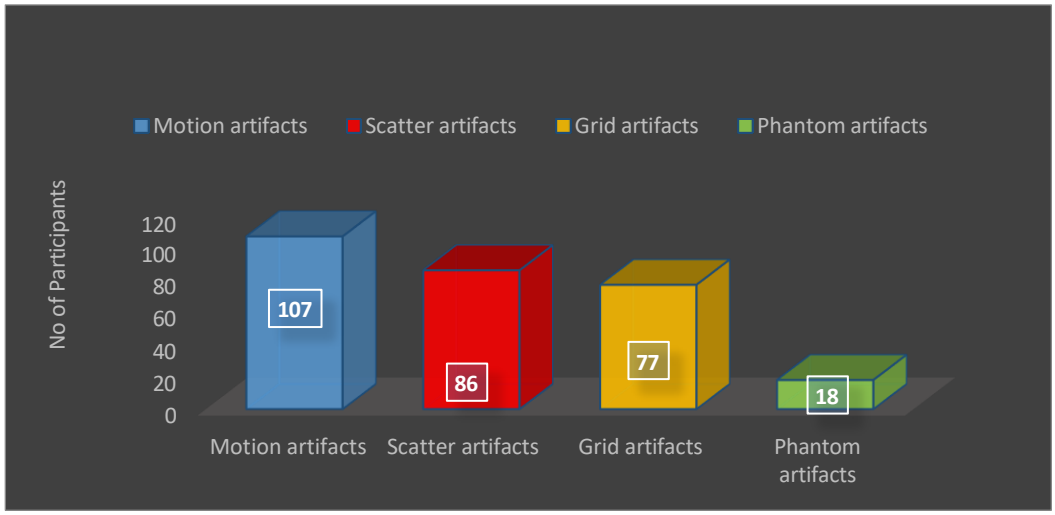


Table no. 19: Shows the Distribution Frequency of rejecting x-ray images due to exposure problems.

Category	No of Participants	Percentage %
Rarely	85	29.5
Occasionally	103	35.8
Frequently	72	25.0
Almost always	28	9.7

Table no. 19: Shows the Distribution Frequency of rejecting x-ray images due to exposure problems.

The largest group, 35.8%, reports that X-ray images are rejected due to exposure problems occasionally,29.5% of participants experience rejection of X-ray images rarely due to exposure problems,25.0% report that rejection due to exposure problems happens frequently, The smallest group, 9.7%, experiences rejection almost always due to exposure problems.

Graph no. 19: Shows the Distribution Frequency of rejecting x-ray images due to exposure problems.

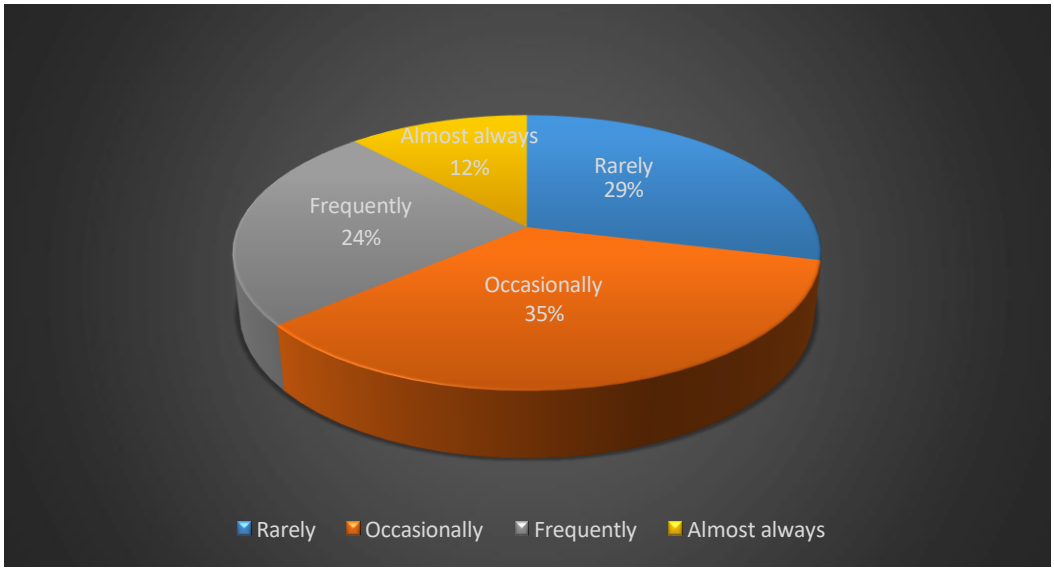


Table no. 20: Shows the Distribution Effect of the measures taken in artifact prevention.

Category	No of Participants	Percentage %
Very effective	92	31.9
Neutral	104	36.1
Ineffective	65	22.6
Very well	27	9.4

Table no. 20: Shows the Distribution Effect of the measures taken in artifact prevention.

The largest group, 36.1%, feels neutral about the effectiveness of artifact prevention measures, 31.9% of participants view the measures as very effective,22.6% report that the measures are ineffective, the smallest group, 9.4%, considers the measures to be very well in preventing artifacts**.**

Graph no. 20: Shows the Distribution Effect of the measures taken in artifact prevention.

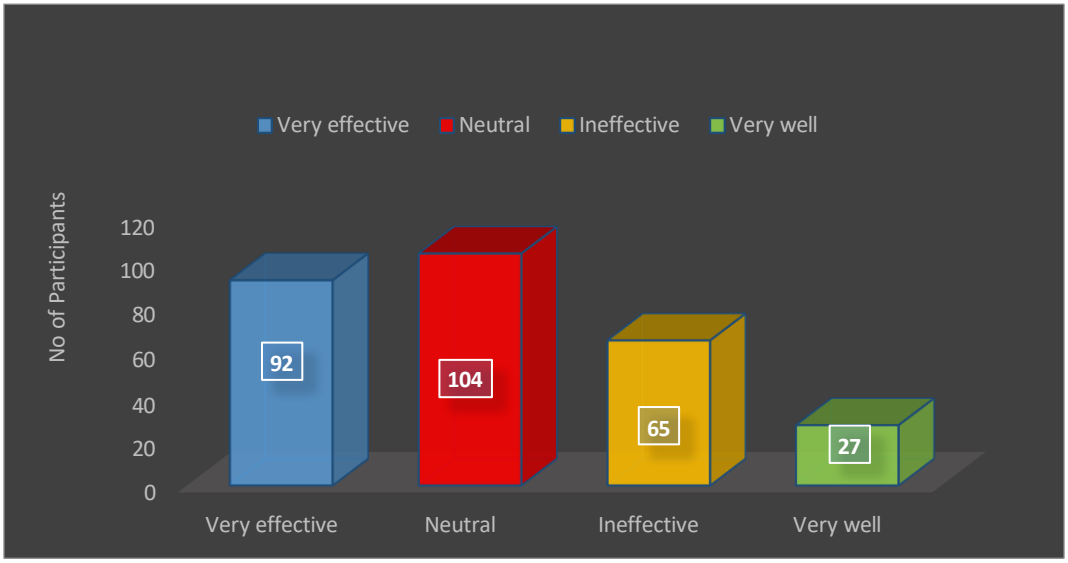


Table no. 21: Shows the Distribution Issues with collimator function contributed to image rejection.

Category	No of Participants	Percentage %
Yes	226	78.5
No	62	21.5

Table no. 21: Shows the Distribution Issues with collimator function contributed to image rejection.

A substantial majority, 78.5%, report that issues with collimator function contribute to image rejection, 21.5% of participants do not perceive collimator function issues as contributing to image rejection.

Graph no. 21: Shows the Distribution Issues with collimator function contributed to image rejection.

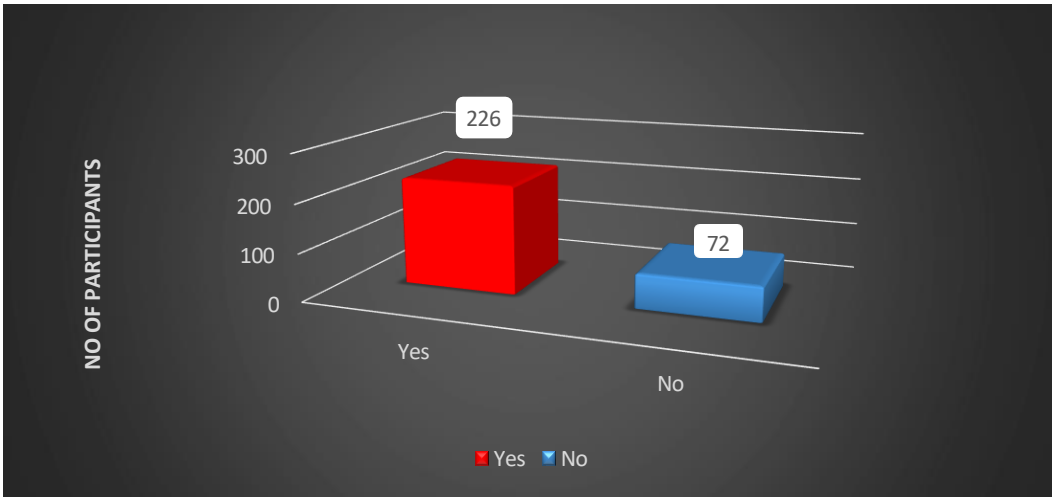


Table no. 22: Shows the Distribution Frequency of encountering x-ray images that you reject.

Category	No of Participants	Percentage %
Almost always	59	20.5
Frequently	99	34.4
Occasionally	89	30.9
Rarely	41	14.2

Table no. 22: Shows the Distribution Frequency of encountering x-ray images that you reject.

The largest group, 34.4%, encounters X-ray images that are rejected frequently,30.9% experience image rejection occasionally,20.5% report that image rejection happens almost always, The smallest group, 14.2%, encounters image rejection rarely.

Graph no. 22: Shows the Distribution Frequency of encountering x-ray images that you reject.

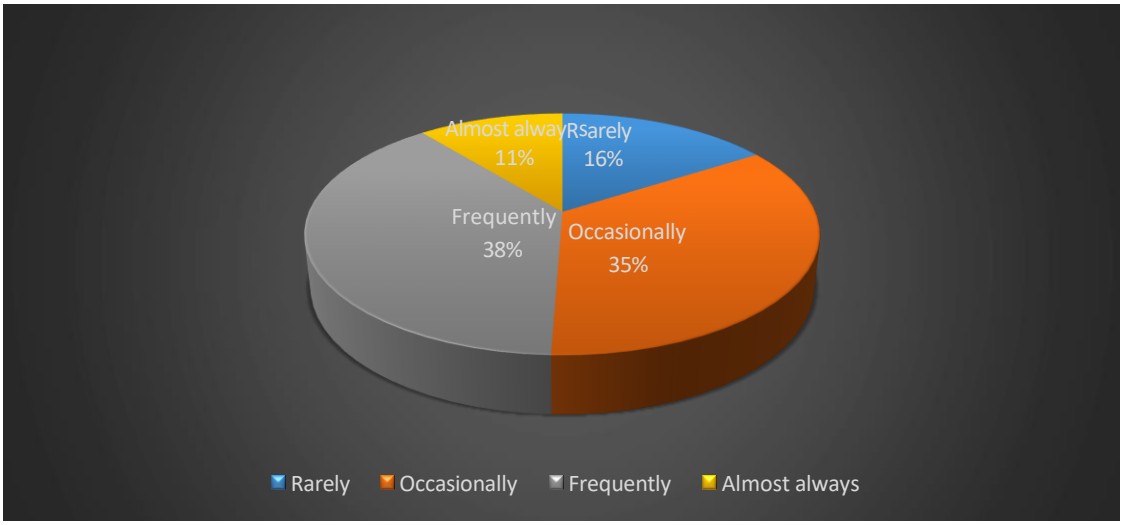


Table no. 23: Shows the Distribution Communicate issue within team.

Category	No of Participants	Percentage %
Verbal communication	85	29.5
Written reports	117	40.6
Electronic communication system	64	22.2
Other (specify)	22	7.6

Table no. 23: Shows the Distribution Communicate issue within team.

The most commonly used method, with 40.6% of participants relying on written reports for communicating issues, 29.5% use verbal communication to address issues,22.2% utilize electronic communication systems, the smallest group, 7.6%, uses other methods (specified by participants)

Graph no. 23: Shows the Distribution Communicate issue within team.

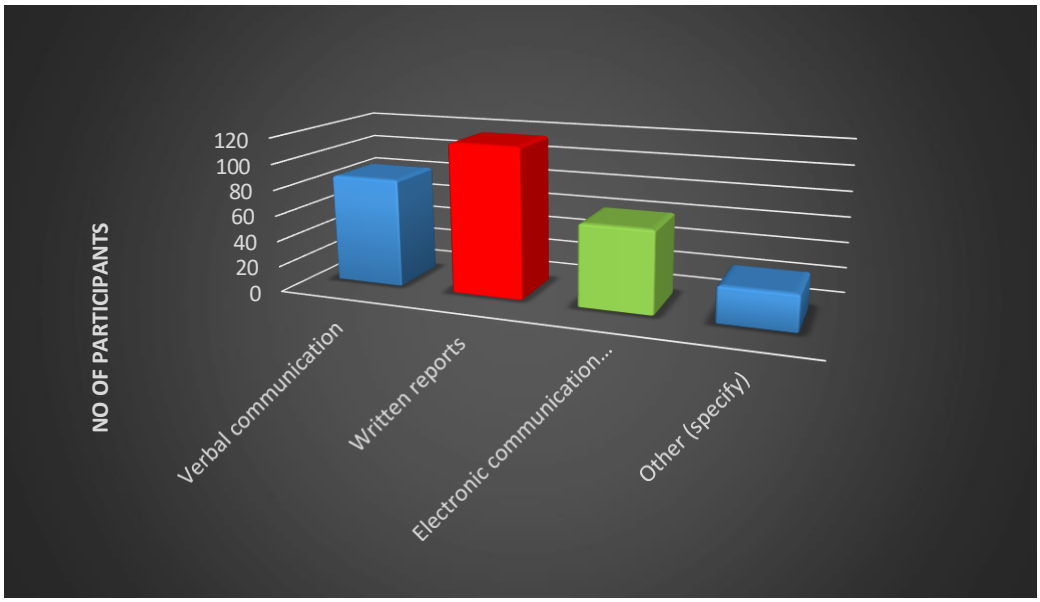


Table no. 24: Shows the Distribution Artifacts influence on decision to reject an x-ray image.

Category	No of Participants	Percentage %
Not influential	70	24.3
Moderately influential	173	60.1
Highly influential	45	15.6

Table no. 24: Shows the Distribution Artifacts influence on decision to reject an x-ray image.

The majority, 60.1%, find artifacts to be moderately influential in the decision to reject an X-ray image,24.3% of participants consider artifacts to be not influential in their decision- making,15.6% report that artifacts are highly influential in their decision to reject an image.

Graph no. 24: Shows the Distribution Artifacts influence on decision to reject an x-ray image.

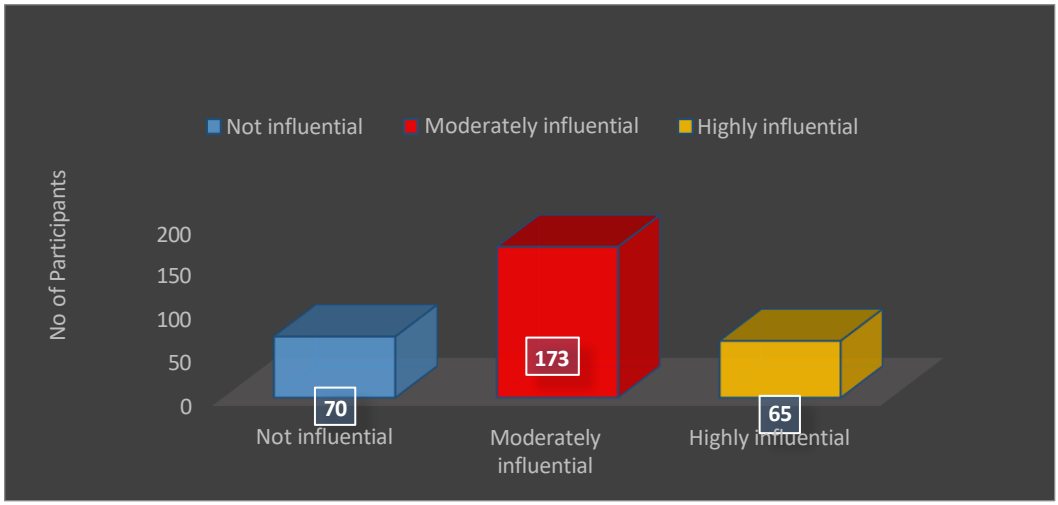


Table no. 25: Shows the Distribution Exposure factors when evaluating x- ray image for acceptance or rejection.

Category	No of Participants	Percentage %
Tube voltage (KVP)	54	18.8
Tube current (MAS)	147	51.0
Exposure time(s)	59	20.5
Source of image distance (SID)	28	9.7

Table no. 25: Shows the Distribution Exposure factors when evaluating x-ray image for acceptance or rejection.

The most significant factor, with 51.0% of participants considering tube current (MAS) as a primary exposure factor when evaluating X-ray images,20.5% of participants focus on exposure time as an important factor, 18.8% consider tube voltage (KVP) important, the least considered factor, with 9.7% of participants noting the source of image distance (SID).

Graph no. 25: Shows the Distribution Exposure factors when evaluating x-ray image for acceptance or rejection.

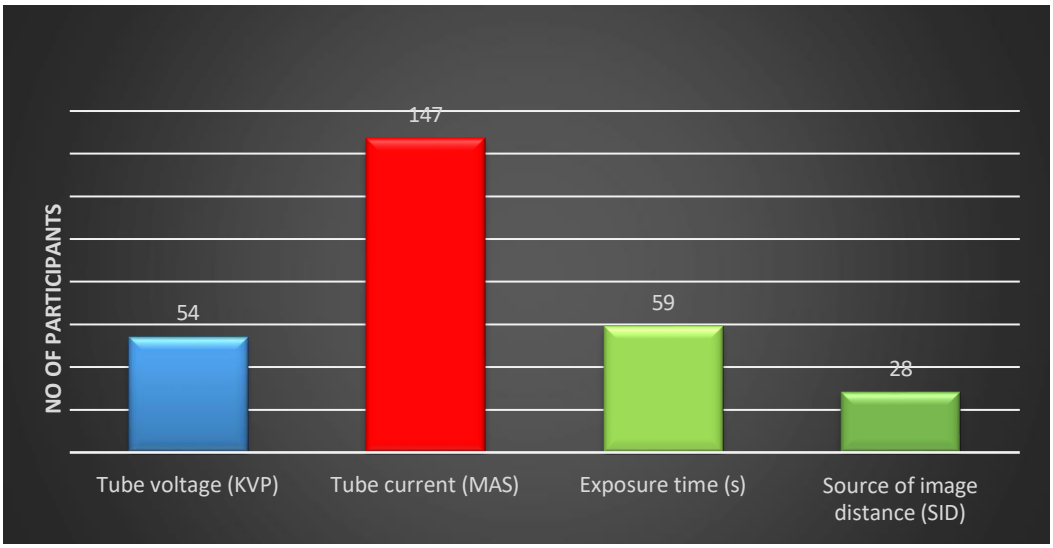


Table no 26: Shows the Distribution Any specific procedural aspects you think could improve to reduce the likelihood of rejected x-ray images.

Category	No of Participants	Percentage %
Patient education on positioning	82	28.5
Enhanced quality control	108	37.5
Updated protocols and guidelines	75	26.0
Facilitating effective communication	23	8.0

Table no 26: Shows the Distribution Any specific procedural aspects you think could improve to reduce the likelihood of rejected x-ray images.

He most favored improvement, with 37.5% of participants suggesting that enhanced quality control measures could significantly reduce image rejection, 28.5% believe that patient education on positioning would help, highlighting the importance of ensuring that patients are properly positioned to avoid image rejection, 26.0% The least prioritized aspect, with 8.0%.

Graph no 26: Shows the Distribution Any specific procedural aspects you think could improve to reduce the likelihood of rejected x-ray images.

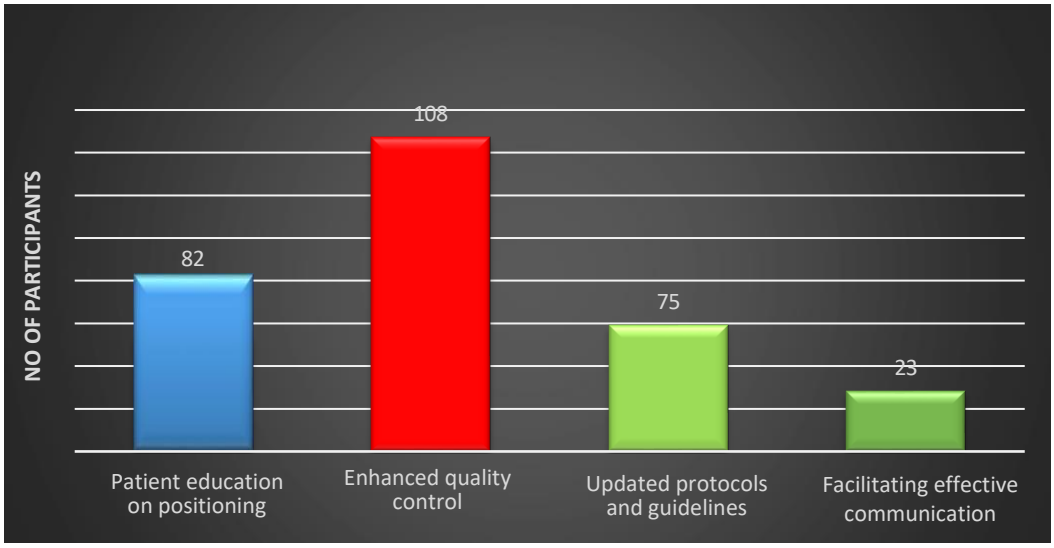


Table no. 27: Shows the Distribution Prioritize adjustments regarding exposure factors when faced with challenges achieving optimal image quality.

Category	No of Participants	Percentage %
Adjusting KVP	72	25.0
Modifying MA Settings	128	44.4
Changing exposure time	67	23.3
Other (Specify)	21	7.3

Table no. 27: Shows the Distribution Prioritize adjustments regarding exposure factors when faced with challenges achieving optimal image quality.

The most prioritized adjustment, with 44.4% of participants focusing on modifying MA settings,25.0% of participants prioritize adjusting KVP (tube voltage),23.3% consider changing exposure time a key adjustment, the smallest group, 7.3%, mentions other adjustments (specified by participants).

Graph no.27: Shows the Distribution Prioritize adjustments regarding exposure factors when faced with challenges achieving optimal image quality.

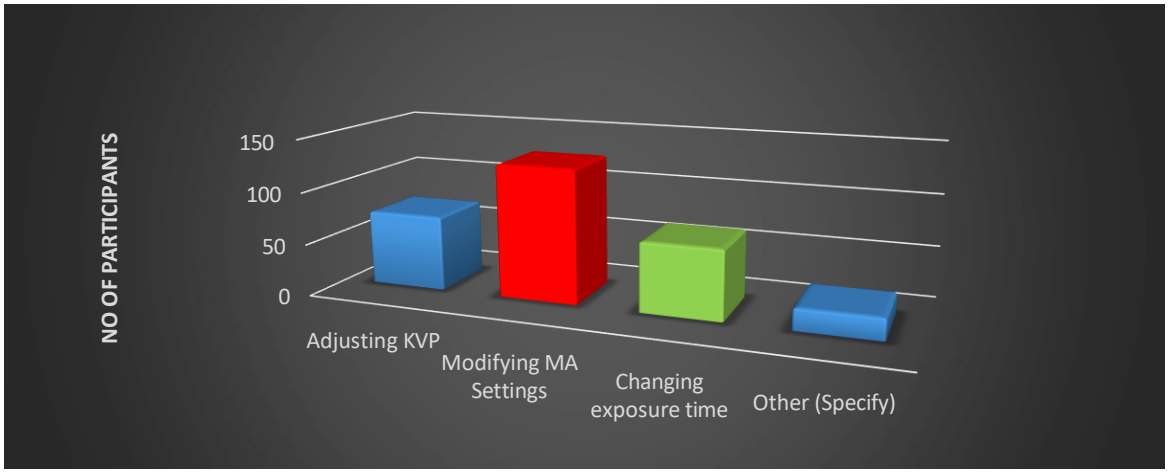


Table no. 28: Shows the Distribution Exposure factor adjustment prioritized when optimizing image for specific clinical indications, such as Orthopedics examination or abdominal studies.

Category	No of Participants	Percentage %
Tube voltage (KVP)	82	28.5
Tube current (MA)	125	43.4
Exposure time(s)	59	20.5
Other (specify)	22	7.6

Table no.28: Shows the Distribution Exposure factor adjustment prioritized when optimizing image for specific clinical indications, such as Orthopedics examination or abdominal studies

The most prioritized adjustment, with 43.4% of participants focusing on tube current (MA),28.5% prioritize tube voltage (KVP), 20.5% focus on exposure time, the smallest group, 7.6%, mentions other adjustments (specified by participants).

Graph no.28: Shows the Distribution Exposure factor adjustment prioritized when optimizing image for specific clinical indications, such as Orthopedics examination or abdominal studies.

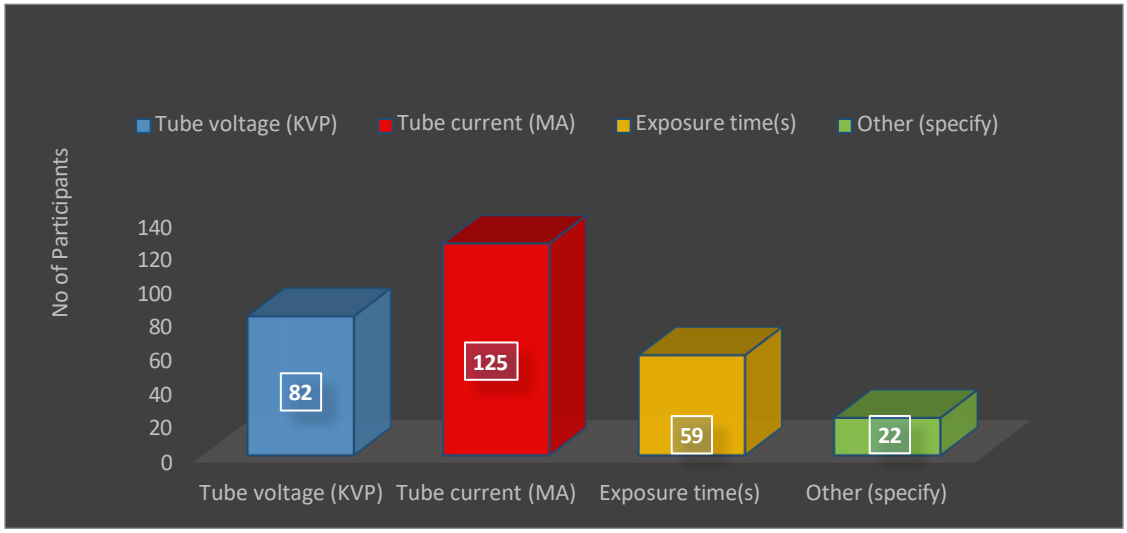


Table no. 29: Shows the Distribution Steps taken before deciding to rejector accept it, when faced with a borderline x-ray image.

Category	No of Participants	Percentage %
Retaking image	89	30.9
Adjusting exposure setting	93	32.3
Contrast	85	29.5
Other (specify)	21	7.3

Table no. 29: Shows the Distribution Steps taken before deciding to reject or accept it, when faced with a borderline x-ray image.

The most common step, with 32.3% of participants focusing on adjusting exposure settings,30.9% choose to retake the image, 29.5% consider adjusting contrast to address borderline images The smallest group, 7.3%, mentions other steps (specified by participants).

Graph no. 29: Shows the Distribution Steps taken before deciding to rejector accept it, when faced with a borderline x-ray image.

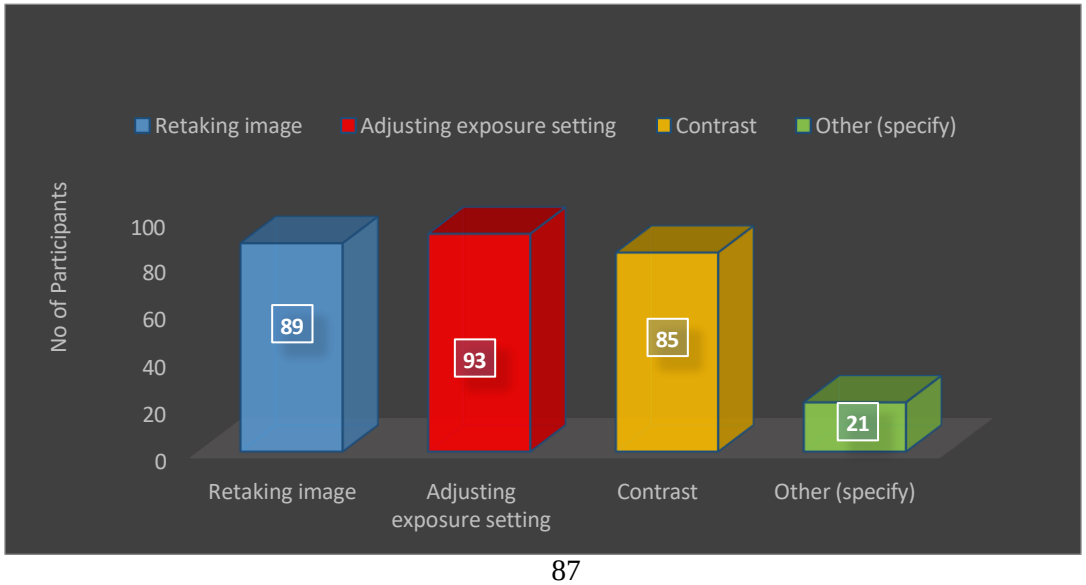


Table no. 30: Shows the Distribution Frequency of involving radiology quality assurance program in addressing exposure factor issues contributing to rejected x-ray images.

Category	No of Participants	Percentage %
Rarely	78	27.1
Occasionally	116	40.3
Frequently	70	24.3
Almost always	24	8.3

Table no. 30: Shows the Distribution Frequency of involving radiology quality assurance program in addressing exposure factor issues contributing to rejected x-ray images.

The largest group, 40.3%, 27.1% of participants involve the QA program rarely, 24.3% involve the QA program frequently, the smallest group, 8.3%, engages the QA program almost always.

Graph no. 30: Shows the Distribution Frequency of involving radiology quality assurance program in addressing exposure factor issues contributing to rejected x-ray images.

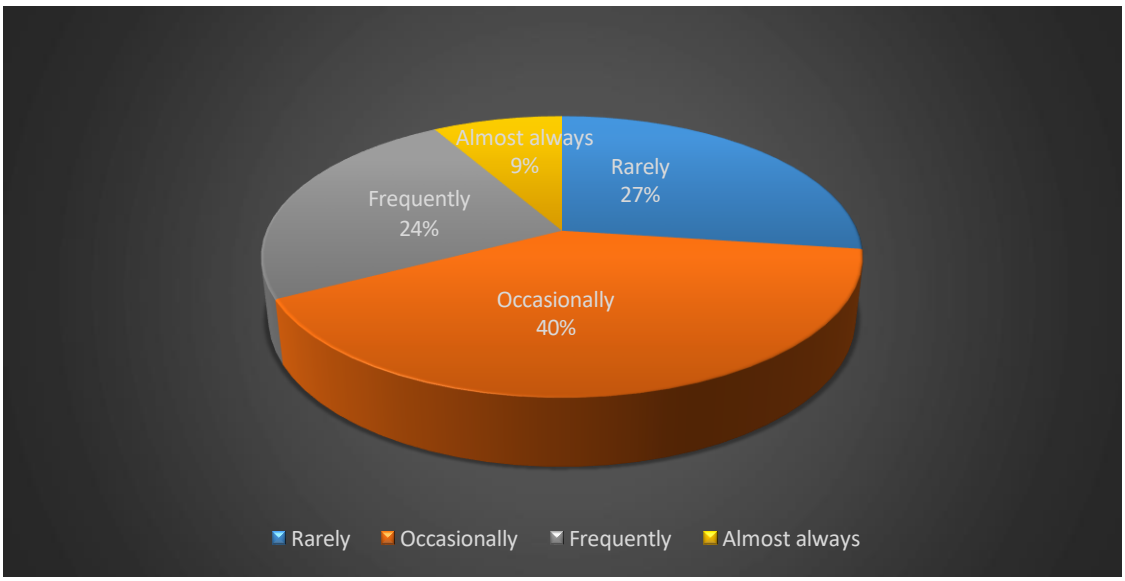


Table no.31: Shows the Distribution Factor considered when adjusting exposure settings

Category	No of Participants	Percentage %
Patient size	90	31.3
Anatomy being imaged	92	31.9
Equipment specifications	77	26.7
Other (specify)	29	10.1

Table no.31: Shows the Distribution Factor considered when adjusting exposure settings**.**

The most frequently considered factor, with 31.9% of participants adjusting exposure settings based on the anatomy being imaged, 31.3% of participants also consider patient size when adjusting exposure settings, 26.7% focus on equipment specifications as a key factor, the smallest group, 10.1%, mentions other factors (specified by participants).

Graph no.31: Shows the Distribution Factor considered when adjusting exposure settings.

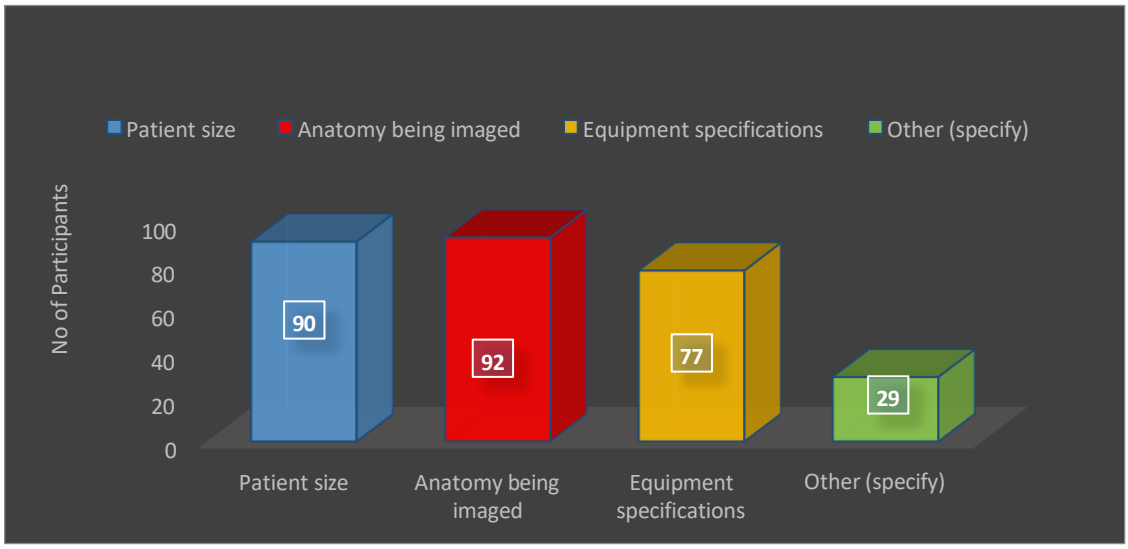


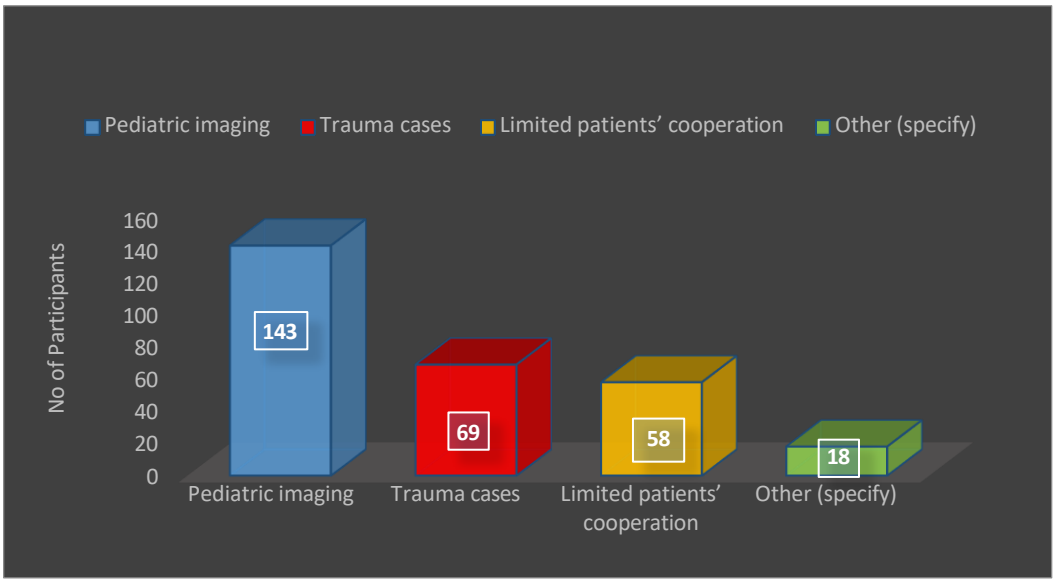
Table no.32: Shows the Distribution Specific scenarios where exposure factor adjustments are more challenging.

Category	No of Participants	Percentage %
Pediatric imaging	143	49.7
Trauma cases	69	24.0
Limited patients' cooperation	58	20.1
Other (specify).	18	6.3

Table no.32: Shows the Distribution Specific scenarios where exposure factor adjustments are more challenging.

The most challenging scenario, with 49.7% of participants finding pediatric imaging particularly difficult for adjusting exposure factors,24.0% report that trauma cases present significant challenges,20.1% find limited patient cooperation to be a major challenge, the smallest group, 6.3%, mentions other scenarios (specified by participants).

Graph no.32: Shows the Distribution Specific scenarios where exposure factor adjustments are more challenging.



CHAPTER – 6

DISCUSSION

The present study was conducted in SANTOSH MEDICAL COLLEGE through Google Forms 288 study Participants. The objective of this study was to assess their knowledge of rejected x-ray images and understand personal practice to radiographers/Technologists in Delhi-NCR, India 2024.

The need for reject analysis has been challenged by the introduction of digital radiography (DR) because of low reported reject rates and because criteria for improperly exposed images were lacking. Most DR systems include quality control (QC) workstations that are capable of modifying the appearance of images before release, and also of deleting poor images before they are analyzed.[21]

As observed in this investigation, the image retake rate before guideline introduction was 4.85%, which is much smaller than the conventional radiography with a reported retake rates of DR found in the United Kingdom (5.5%) as well as in Australia and the united states.[22]

Results of the repeat rate by exam are presented the major factors contributing the causes of rejection were anatomical side marker, followed by collimation and positioning error our study in agreement of Fathi Awad et al., reported that (position 36.36%, over exposure 27.27%, under exposure 27.27% and motion 9.09%). Itis clear that imaging procedures due to position error represents the highest cause of repeat rate the positioning errors beside the considerable inequality in radiographer reject rate suggest that the standards of image quality in the radiology department may not be harmonious.[23]

The analysis criteria used for the study provides summarized data for ease of interpretation and

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circulation within the department, but it does not rule out the option for more detailed analysis as the raw data from the workstations is retained on a central server. However, data reliability cannot be fully guaranteed as there may be inaccurate selection of the rejection criteria at the point of image rejection, factors similar to those reported by other authors.[24]

There are some discrepancies in the results of the reason for deleting image in our and Andersen's study. For example, found an overall positioning errors of 77% while our results showed 82.3% (centering and other positioning errors). There is a tradeoff between the validity of the result on reject rate and on reasons for reject. This further adds various patients factor like movement, not able to hold breath and non-compliance of instructions by patients were responsible for the rejection of the x-ray films.[25]

Finally, it was said that the main objective of x-ray examination is to obtain optimum diagnostic information with minimum diagnostic exposure. This can be achieved by considering the use of X-ray equipment, its design and how the procedure is performed. This study pointed out that the repeat rate in the Shahied Motahari hospital is relatively higher compared to other hospitals. This hospital is dedicated to infants, children and women. So, it seems that the application of some special considerations for this radiology department is necessary.[26]

The results obtained by this repeat analysis study provided valuable information to suggest preventive measures to reduce repeats. In this regard the following recommendations are prescribed for the radiology department to reduce the repeat rate and to improve the radiation safety culture.

Overall, the findings highlight key areas for improvement in communication, quality control, and collaboration within radiographic imaging practices. Addressing these issues could significantly enhance image quality and reduce the frequency of rejections.

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CHAPTER – 7

CONCLUSION

The survey results highlight several critical areas for improvement in radiographic imaging practices. The predominantly young and highly educated workforce, with most respondents holding advanced degrees and employed in larger healthcare settings, reflects a dynamic and evolving field. However, significant challenges remain, particularly in communicating reasons for image rejection, of respondents reporting difficulties. Despite having standardized processes in place, the effectiveness of these systems varies, indicating a need for better communication strategies. The high frequency of x-ray image rejections due to blurring from patient movement and technical issues underscores the importance of enhancing quality control measures. Furthermore, the variability in perceptions of image quality, with issues related to exposure and contrast frequently reported, suggests that standardizing evaluation criteria could improve consistency. Pediatric imaging presents additional challenges, highlighting the need for tailored exposure adjustment strategies. To address these issues, respondents advocate for improved quality control, better interdepartmental collaboration, and more consistent involvement of quality assurance programs. Overall, addressing these concerns could significantly enhance image quality and operational efficiency in radiographic imaging.

RECOMMENDATION

The following recommendations are made for radiology RADIOGRAPHERS/TECHNOLOGIST Regularly reflect on your imaging practices and identify opportunities for personal and professional growth. Set goals for improving image quality and reducing the frequency y of image rejection.

All radiographers must also be work skill Regularly review and practice key technical skills, including exposure settings, collimation, and proper use of imaging equipment. This can help reduce errors and improve image quality.

Additionally, we advise that hospitals regularly audit their inventory of radiological practice, reduce the frequency of X-ray image rejection, and improve overall diagnostic accuracy. If these approaches have improved RADIOGRAPHY/TECHNOLOGIST comfort, further assessment can be done. To create a safer atmosphere for imaging, radiology technologists must also follow the rules set by several national and international organizations.

CHAPTER – 8

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LETTER OF ETHICAL CLEARANCE FOR DISSERTATIONFROM REGISTRAR OFFICE

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F. No. SU/R/2024/1344[54] Dated: 17.05.2024

Subject: Grant of Ethical Clearance for **Dissertation Protocol** Topic **"A Survey of Radiographers to Assess the Reason of Rejecting X-ray Film",** submitted by **SWATI BANSAL,** student of M.Sc Medical Imaging Technology, 2022 Batch.

*****

With reference to the request for grant of Ethical Clearance for the Dissertation Protocol entitled **"A Survey of Radiographers to Assess the Reason of Rejecting X-ray Film"**, **SWATI BANSAL** is informed that the **Dissertation Protocol** submitted by him/her was considered by the **Screening Committee** of the **Allied Health Sciences** in its meetings held on 07.02.2024 and 29.02.2024. The recommendations of the **Screening Committee** were considered in detail by the **Institutional Ethics Committee** in its meeting held on **15.05.2024** and the same was **approved** by the **Ethics Committee** of the **Santosh Deemed to be University, Ghaziabad, Delhi NCR**.

He /She is informed accordingly for further necessary action.

17/5/24

[Dr. EZHILRAJAN. K]
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SWATI BANSAL
M.Sc Medical Imaging Technology.

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Preparation ofthesis proposal	21	15-07-23	05-08-23							
Presentation ofthesis proposal	25	05-08-23	30-08-23							
Preparation & Submission Thesis Application in Ethics Committee	41	30-08-23	10-10-23							
Review ofLiterature	89	10-10-23	07-01-24							
Data Collection	80	17-02-24	24-05-24							
Data Analysis	7	24-06-24	31-06-24							
Finding & Recommendations	10	31-07-24	10-08-24							
Report Writing	39	02-08-24	09-09-24							
Submission ofthesis	21	09-09-24	27-09-24							
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